MUSKRAT FALLS GENERATION FACILITY AND LABRADOR – ISLAND TRANSMISSION LINK

OVERVIEW OF DECISION GATE 2 CAPITAL COST AND SCHEDULE ESTIMATES

Technical Note

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[redacted]

nalcor energy
LOWER CHURCHILL PROJECT

Contents

1.0 Purpose

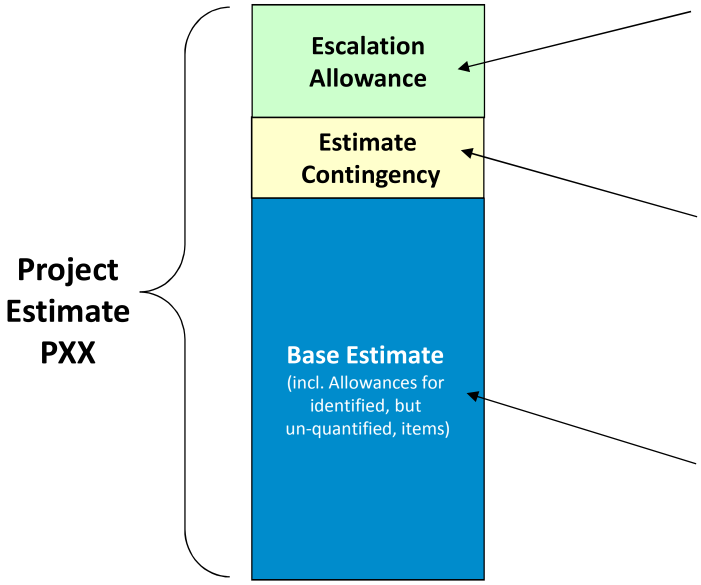
The purpose of this Technical Note is to provide:

- 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



Escalation Allowance
Provision for changes in price levels driven by economic conditions. Includes inflation. Estimated using economic indices weighted against base estimate components.

Estimate Contingency
Provision for uncertainties, risks and changes within the project's scope that result of maturity of cost and schedule estimates. These uncertainties are referred to as Tactical Risks. Does not cover scope changes outside the project's boundaries, events such as strikes or natural disasters, or escalation and currency effects.

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

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.

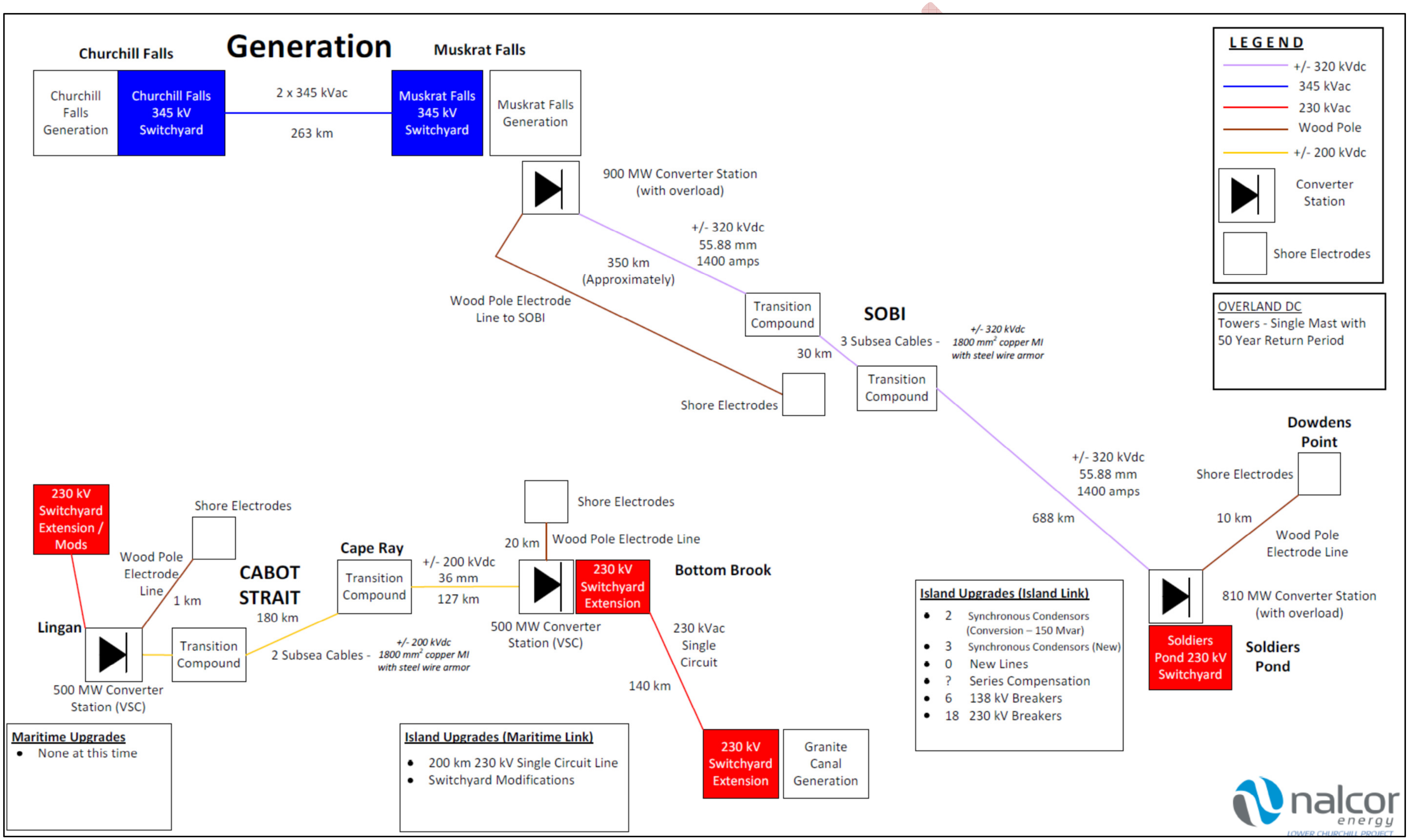
Labrador – Island Transmission Link is a 320 kV, 900 MW HVdc transmission link between Labrador to Newfoundland comprising of converter stations at Muskrat Falls and at Soldiers Pond, a switchyard at Soldiers Pond with interconnect to the existing 230 HVac network, 3 off mass impregnated submarine cables (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.

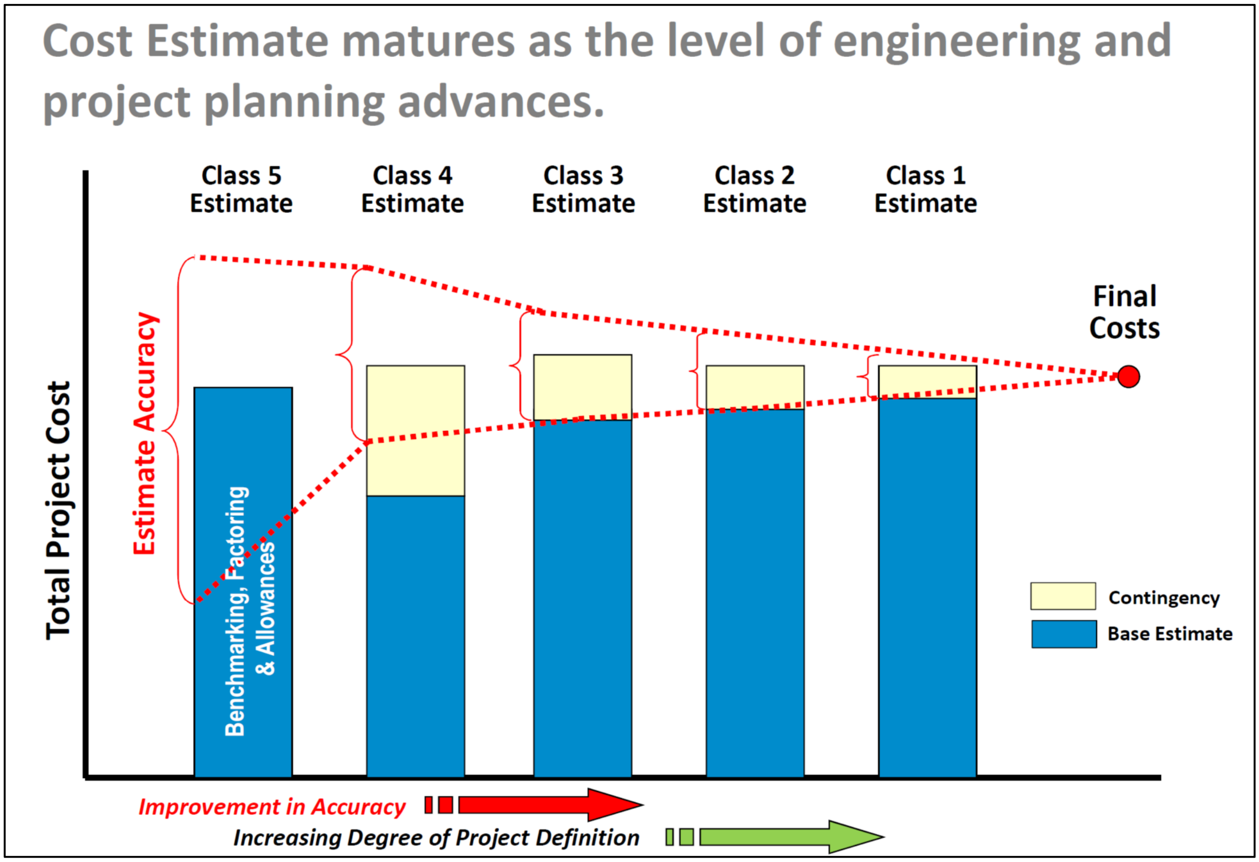
Figure 2: Schematic of LCP Phase I Development



6.0 Basis of Estimate

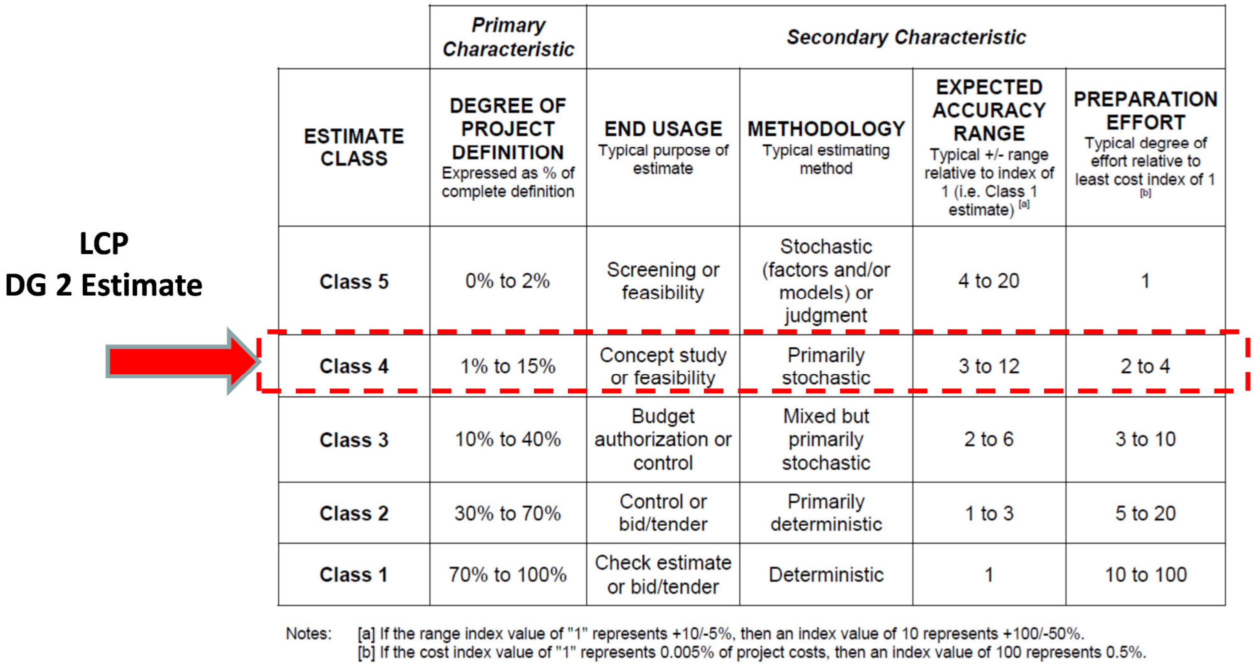
During the lifecycle of all projects, such as the Lower Churchill Project, it is typical for the capital cost estimate to evolve as the project definition matures, as illustrated in Figure 3. (Note: While the amount of total engineering completed is often used to characterize the level of project definition, 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



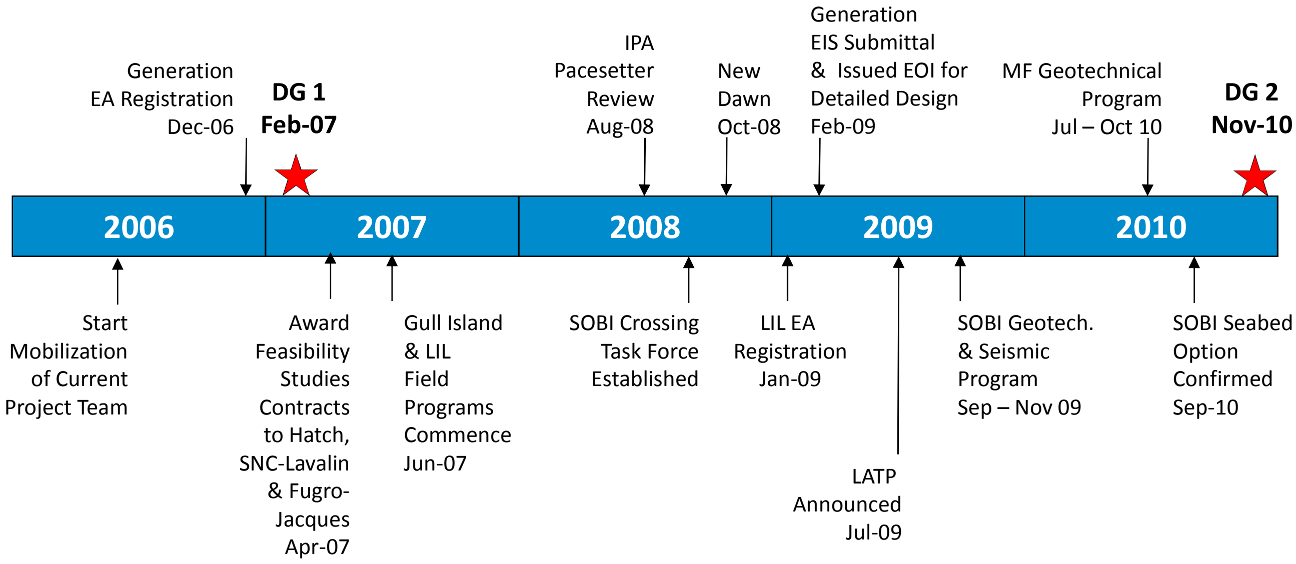
	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**DEGREE OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical +/- range relative to index of 1 (i.e. Class 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.

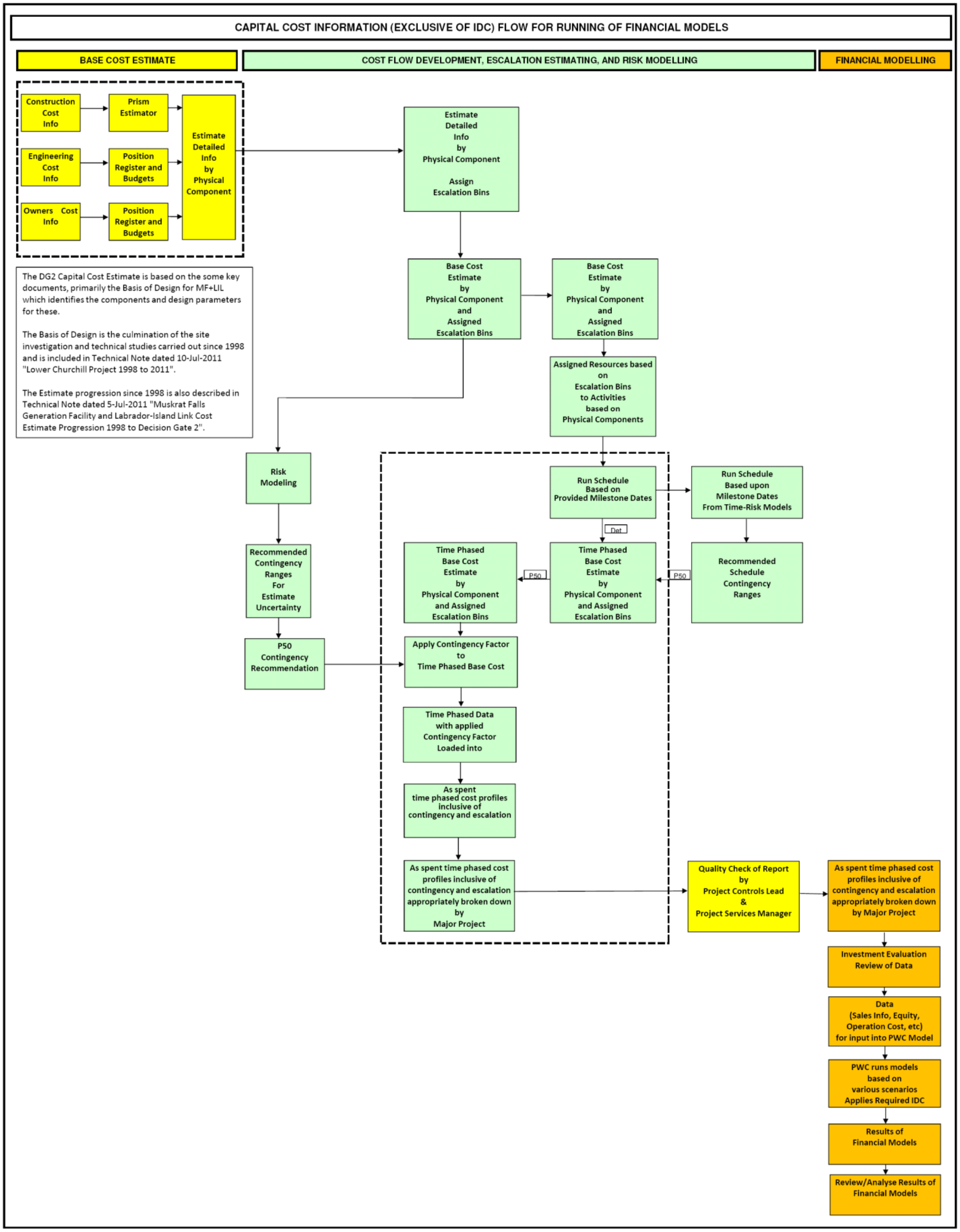
To this effect, during Gateway Phase 2 engineering and project execution planning proceeded concurrently with investment analysis. These two analyses were synchronized when capital cost flows for the development options were fed into the economic model, as per Figure 5.

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



The DG2 Capital Cost Estimate is based on the some key documents, primarily the Basis of Design for MF+LIL which identifies the components and design parameters for these.

The Basis of Design is the culmination of the site investigation and technical studies carried out since 1998 and is included in Technical Note dated 10-Jul-2011 "Lower Churchill Project 1998 to 2011".

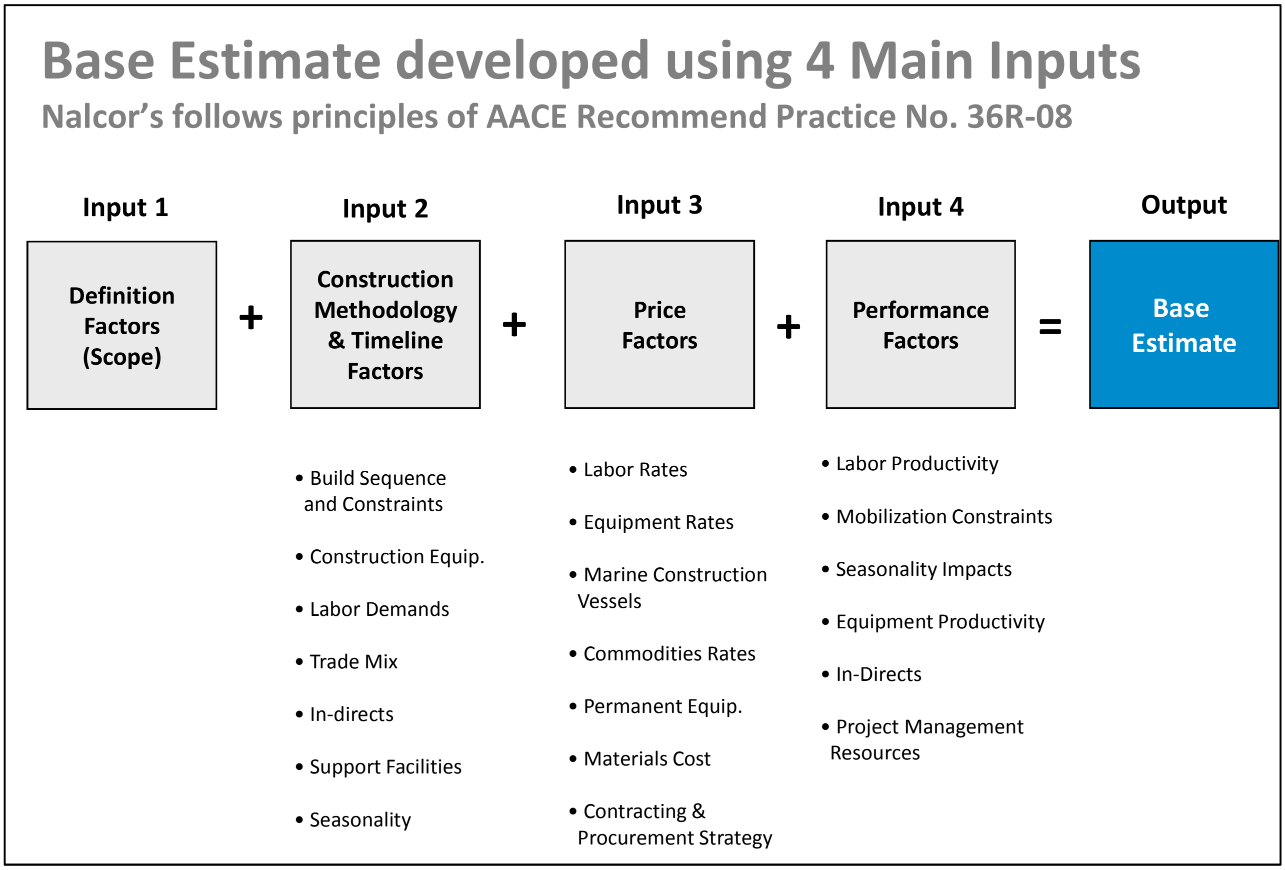
The Estimate progression since 1998 is also described in Technical Note dated 5-Jul-2011 "Muskrat Falls Generation Facility and Labrador-Island Link Cost Estimate Progression 1998 to Decision Gate 2".

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



Base Estimate developed using 4 Main Inputs

Nalcor's follows principles of AACE Recommend Practice No. 36R-08

Input 1: **Definition Factors (Scope)** + **Input 2**: **Construction Methodology & Timeline Factors** + **Input 3**: **Price Factors** + **Input 4**: **Performance Factors** = **Output**: **Base Estimate**

Input 2 – Construction Methodology & Timeline Factors:

- Build Sequence and Constraints
- Construction Equip.
- Labor Demands
- Trade Mix
- In-directs
- Support Facilities
- Seasonality

Input 3 – Price Factors:

- Labor Rates
- Equipment Rates
- Marine Construction Vessels
- Commodities Rates
- Permanent Equip.
- Materials Cost
- Contracting & Procurement Strategy

Input 4 – Performance Factors:

- Labor Productivity
- Mobilization Constraints
- Seasonality Impacts
- Equipment Productivity
- In-Directs
- Project Management Resources

Figure 7: Work Breakdown Structure (WBS)

1 LCP General
- 1.0 LCP General
  - 1.0.00 General Administration
- 1.1 Project Management
  - 1.1.00 Project Management General
- 1.2 Engineering
  - 1.2.00 Engineering General
- 1.3 Environmental Affairs
  - 1.3.00 Envronmental Affairs General
- 1.4 Aboriginal Affairs
  - 1.4.00 Aboriginal Affairs
- 1.5 Construction Management
  - 1.5.00 Construction Management General
- 1.8 Power Sales and Marketing
  - 1.8.00 Power Sales and Marketing General
- 1.9 Project Financing
  - 1.9.00 Project Financing General

3 Muskrat Falls
- 3.0 Muskrat Falls General
  - 3.0.00 Muskrat Falls General
- 3.1 Infrastructure and Support
  - 3.1.00 Infrastructure and Support General
  - 3.1.10 Offices
  - 3.1.11 Access
  - 3.1.13 Construction Power
  - 3.1.14 Construction Telecommunications
  - 3.1.15 Accomodation Complex
  - 3.1.16 Site Services
  - 3.1.17 Housing Facilities HVGB
  - 3.1.18 Offsite Logistics Infrastructure and Support
- 3.2 Generation Facility
  - 3.2.00 Generation Facilty General
  - 3.2.21 Reservoir
  - 3.2.23 Dams and Cofferdams
  - 3.2.24 Spillway
  - 3.2.25 Approach Channel
  - 3.2.28 North Spur
  - 3.2.31 Tailrace
  - 3.2.32 Intake
  - 3.2.33 Powerhouse and Related Facilities
  - 3.2.34 Turbines and Generators
  - 3.2.35 Balance of Plant
  - 3.2.92 Operations Telecommunications
- 3.4 Switchyards
  - 3.4.00 Switchyards General
  - 3.4.10 Churchill Falls Switchyard Extension
  - 3.4.30 Muskrat Falls Switchyard
- 3.6 OL Transmission
  - 3.6.00 OL Transmission General
  - 3.6.14 AC Tx Muskrat Falls to Churchill Falls
  - 3.6.16 AC Collector Lines to Switchyards
- 3.9 Habitat Compensation
  - 3.9.00 Habitat Compensation General
  - 3.9.11 Muskrat Falls Fish Habitat Compensation
  - 3.9.12 Muskrat Falls Terestrial Habitat Compensation

4 Island Link
- 4.0 Island Link General
  - 4.0.00 Island Link General
- 4.1 Infrastructure and Support
  - 4.1.00 Infrastructure and Support General
  - 4.1.10 Offices
  - 4.1.11 Access
  - 4.1.13 Construction Power
  - 4.1.14 Construction Telecommunications
  - 4.1.16 Site Services
  - 4.1.17 Housing Facilities
  - 4.1.18 Offsite Logistics Infrastructure and Support
- 4.4 Switchyards
  - 4.4.00 Switchyards General
  - 4.4.50 Soldiers Pond Switchyard
- 4.6 OL Transmission
  - 4.6.00 OL Transmission General
  - 4.6.13 AC Tx Muskrat Falls Switchyard to Converter Station
  - 4.6.22 DC TX SOBI to Soldiers Pond
  - 4.6.27 DC Tx Muskrat Falls to SOBI
  - 4.6.31 Electrode Line - Labrador
  - 4.3.32 Electrode Line - Newfoundland East
- 4.7 System Upgrades
  - 4.7.00 System Upgrades General
  - 4.7.10 Island Upgrades - East
- 4.8 DC Specialties
  - 4.8.00 DC Specialties General
  - 4.8.11 Marine Crossing - SOBI
  - 4.8.21 Labrador Converter Station
  - 4.8.22 Soldiers Pond Converter Station
  - 4.8.51 Transition Compound Labrador
  - 4.8.52 Transition Compound Northern Peninsula
  - 4.8.61 Electrode Labrador
  - 4.8.62 Electrode Newfoundland East
- 4.9 Habitat Compensation
  - 4.9.00 Habitat Compensation General
  - 4.9.11 Island Link Fish Habitat Compensation

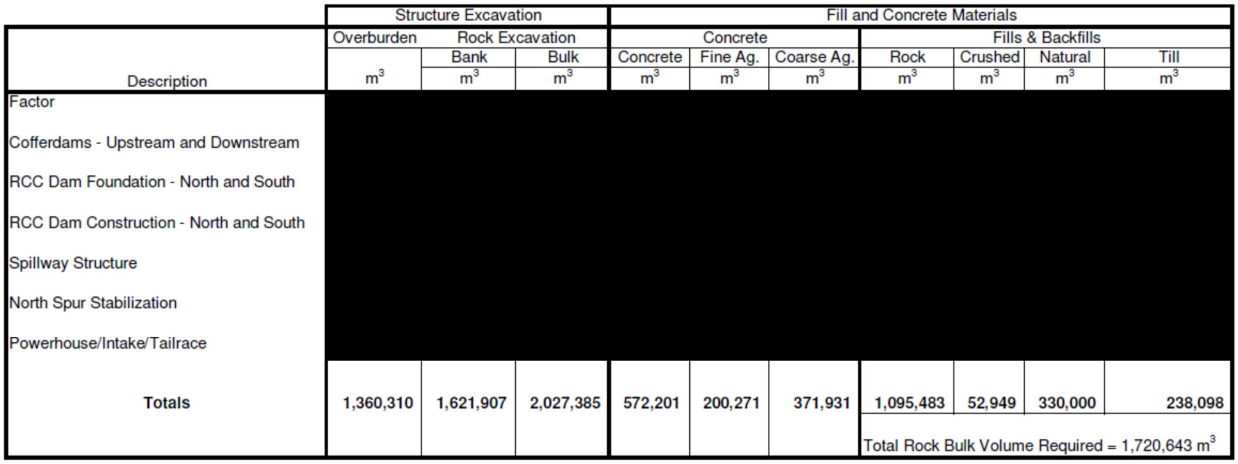
5 Maritime Link
- 5.0 Maritime Link General
  - 5.0.00 Maritime Link General
- 5.1 Infrastructure and Support
  - 5.1.00 Infrastructure and Support General
  - 5.1.10 Offices
  - 5.1.11 Access
  - 5.1.13 Construction Power
  - 5.1.14 Construction Telecommunications
  - 5.1.16 Site Services
  - 5.1.17 Housing Facilities
  - 5.1.18 Offsite Logistics Infrastructure and Support
- 5.4 Switchyards
  - 5.4.00 Switchyards General
  - 5.4.60 Maritime Switchyard
  - 5.4.70 Bottom Brook Switchyard
  - 5.4.80 Granite Canal Switchyard
- 5.6 OL Transmission
  - 5.6.00 OL Transmission General
  - 5.6.17 AC Tx Bottom Brook to Granite Canal
  - 5.6.26 DC Tx Cape Ray to Bottom Brook
  - 5.6.33 Electrode Line - Maritimes
  - 5.6.34 Electrode Line - Newfoundland West
- 5.7 System Upgrades
  - 5.7.00 System Upgrades General
  - 5.7.20 Island Upgrades - West
  - 5.7.30 Maritime Upgrades
- 5.8 DC Specialties
  - 5.8.00 DC Specialties General
  - 5.8.12 Marine Crossing - Maritimes
  - 5.8.23 Maritime Converter Station
  - 5.8.24 Newfoundland West Converter Station
  - 5.8.53 Transition Compound Newfoundland West
  - 5.8.54 Transition Compound Maritimes
  - 5.8.63 Electrode Maritime
  - 5.8.64 Electrode Newfoundland West
- 5.9 Habitat Compensation
  - 5.9.00 Habitat Compensation General
  - 5.9.11 Maritime Link Fish 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			
		Bank	Bulk	Concrete	Fine Ag.	Coarse Ag.	Rock	Crushed	Natural	Till
Description	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
Factor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Cofferdams - Upstream and Downstream	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
RCC Dam Foundation - North and South	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
RCC Dam Construction - North and South	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Spillway Structure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
North Spur Stabilization	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Powerhouse/Intake/Tailrace	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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

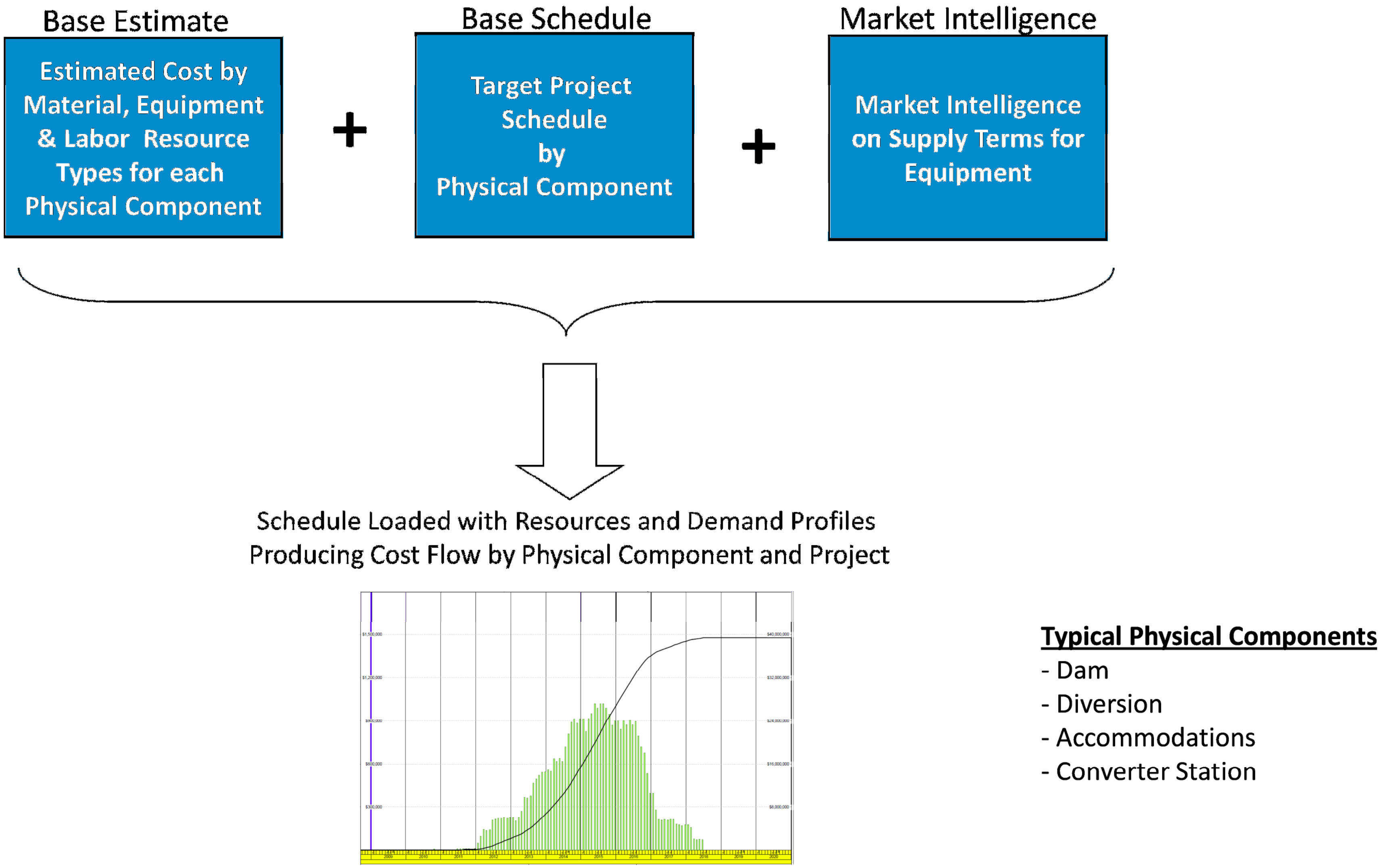
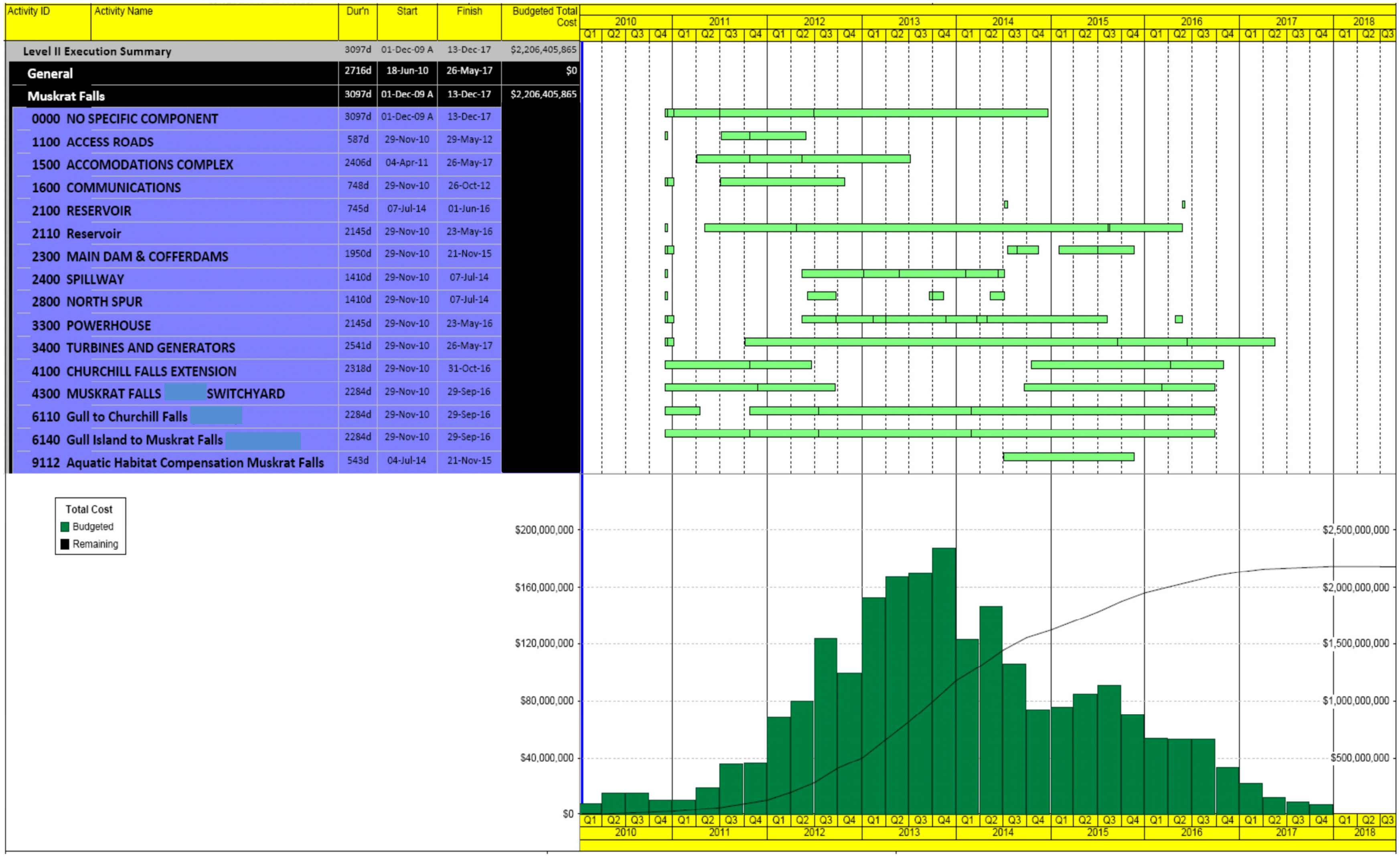
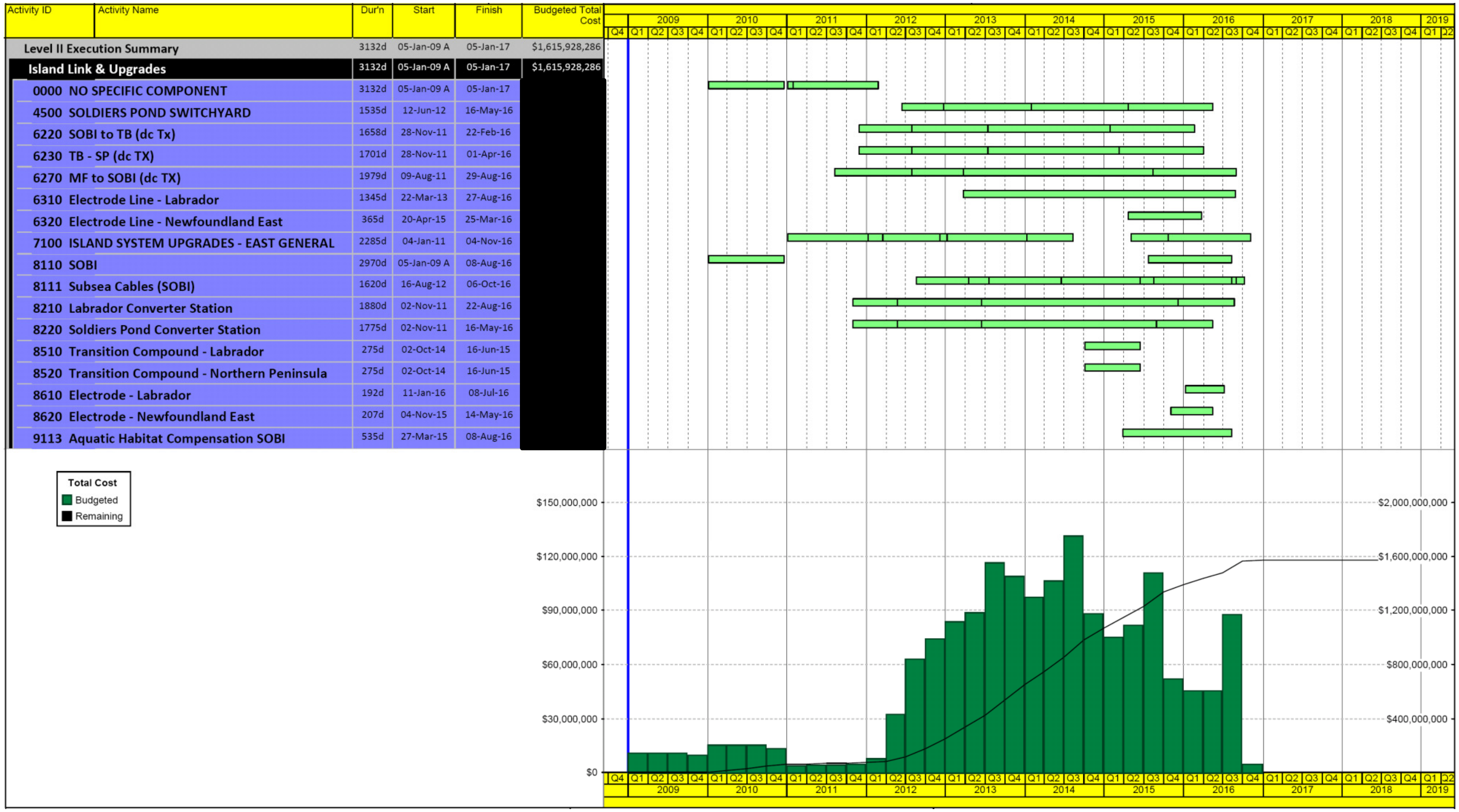


Figure 8: Cost Flow for Muskrat Falls Generation Facility



Activity ID	Activity Name	Dur'n	Start	Finish	Budgeted Total Cost
Level II Execution Summary		3097d	01-Dec-09 A	13-Dec-17	$2,206,405,865
General		2716d	18-Jun-10	26-May-17	$0
Muskrat Falls		3097d	01-Dec-09 A	13-Dec-17	$2,206,405,865
0000	NO SPECIFIC COMPONENT	3097d	01-Dec-09 A	13-Dec-17	[redacted]
1100	ACCESS ROADS	587d	29-Nov-10	29-May-12	[redacted]
1500	ACCOMODATIONS COMPLEX	2406d	04-Apr-11	26-May-17	[redacted]
1600	COMMUNICATIONS	748d	29-Nov-10	26-Oct-12	[redacted]
2100	RESERVOIR	745d	07-Jul-14	01-Jun-16	[redacted]
2110	Reservoir	2145d	29-Nov-10	23-May-16	[redacted]
2300	MAIN DAM & COFFERDAMS	1950d	29-Nov-10	21-Nov-15	[redacted]
2400	SPILLWAY	1410d	29-Nov-10	07-Jul-14	[redacted]
2800	NORTH SPUR	1410d	29-Nov-10	07-Jul-14	[redacted]
3300	POWERHOUSE	2145d	29-Nov-10	23-May-16	[redacted]
3400	TURBINES AND GENERATORS	2541d	29-Nov-10	26-May-17	[redacted]
4100	CHURCHILL FALLS EXTENSION	2318d	29-Nov-10	31-Oct-16	[redacted]
4300	MUSKRAT FALLS [redacted] SWITCHYARD	2284d	29-Nov-10	29-Sep-16	[redacted]
6110	Gull to Churchill Falls [redacted]	2284d	29-Nov-10	29-Sep-16	[redacted]
6140	Gull Island to Muskrat Falls [redacted]	2284d	29-Nov-10	29-Sep-16	[redacted]
9112	Aquatic Habitat Compensation Muskrat Falls	543d	04-Jul-14	21-Nov-15	[redacted]

Figure 9: Cost Flow for Labrador – Island Transmission Link



Activity ID	Activity Name	Dur'n	Start	Finish	Budgeted Total Cost
Level II Execution Summary		3132d	05-Jan-09 A	05-Jan-17	$1,615,928,286
Island Link & Upgrades		3132d	05-Jan-09 A	05-Jan-17	$1,615,928,286
0000 NO SPECIFIC COMPONENT		3132d	05-Jan-09 A	05-Jan-17	[redacted]
4500 SOLDIERS POND SWITCHYARD		1535d	12-Jun-12	16-May-16	[redacted]
6220 SOBI to TB (dc Tx)		1658d	28-Nov-11	22-Feb-16	[redacted]
6230 TB - SP (dc TX)		1701d	28-Nov-11	01-Apr-16	[redacted]
6270 MF to SOBI (dc TX)		1979d	09-Aug-11	29-Aug-16	[redacted]
6310 Electrode Line - Labrador		1345d	22-Mar-13	27-Aug-16	[redacted]
6320 Electrode Line - Newfoundland East		365d	20-Apr-15	25-Mar-16	[redacted]
7100 ISLAND SYSTEM UPGRADES - EAST GENERAL		2285d	04-Jan-11	04-Nov-16	[redacted]
8110 SOBI		2970d	05-Jan-09 A	08-Aug-16	[redacted]
8111 Subsea Cables (SOBI)		1620d	16-Aug-12	06-Oct-16	[redacted]
8210 Labrador Converter Station		1880d	02-Nov-11	22-Aug-16	[redacted]
8220 Soldiers Pond Converter Station		1775d	02-Nov-11	16-May-16	[redacted]
8510 Transition Compound - Labrador		275d	02-Oct-14	16-Jun-15	[redacted]
8520 Transition Compound - Northern Peninsula		275d	02-Oct-14	16-Jun-15	[redacted]
8610 Electrode - Labrador		192d	11-Jan-16	08-Jul-16	[redacted]
8620 Electrode - Newfoundland East		207d	04-Nov-15	14-May-16	[redacted]
9113 Aquatic Habitat Compensation SOBI		535d	27-Mar-15	08-Aug-16	[redacted]

Figure 10: Trade Labor Histogram for Muskrat Falls Generating Facility

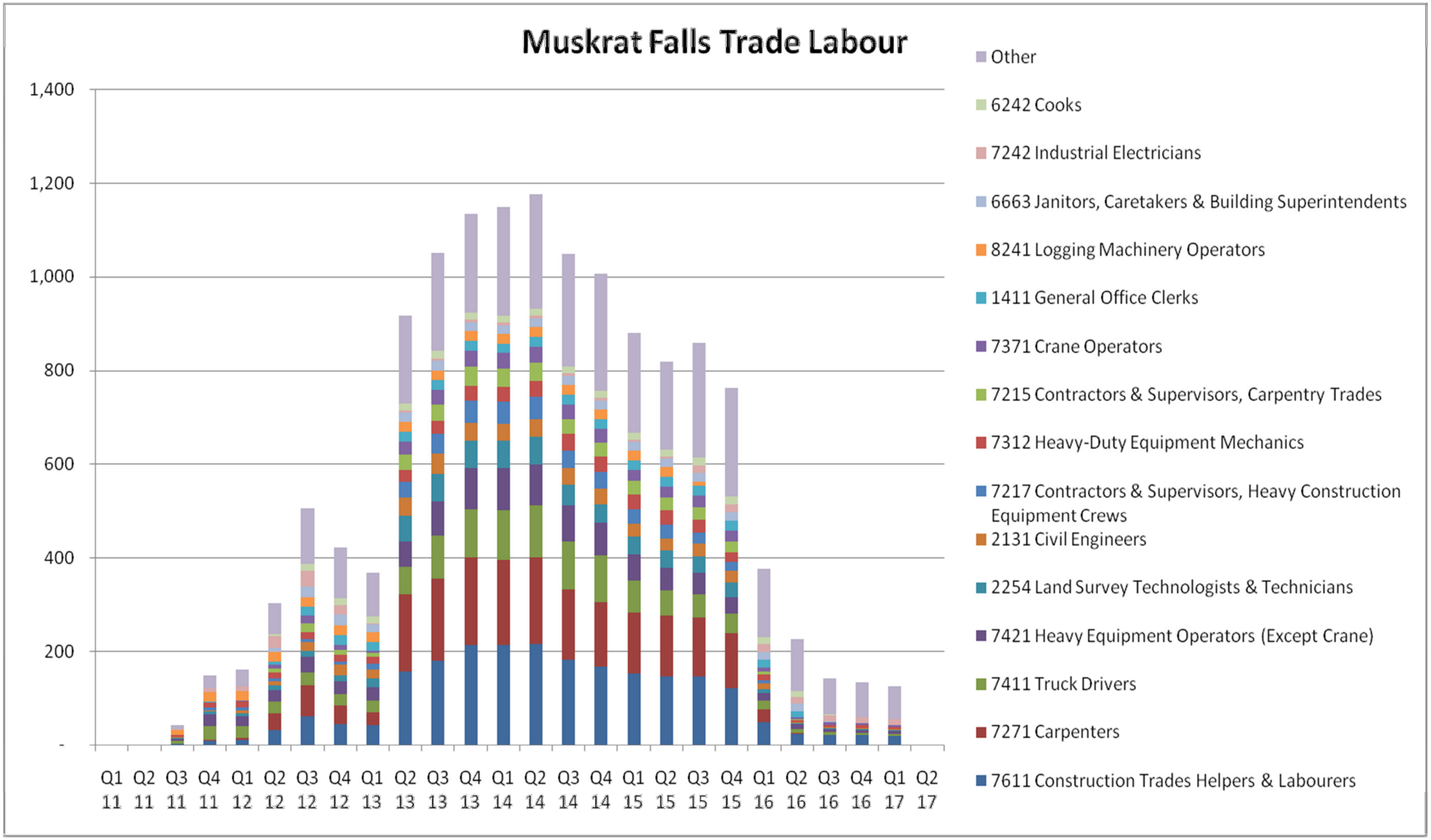
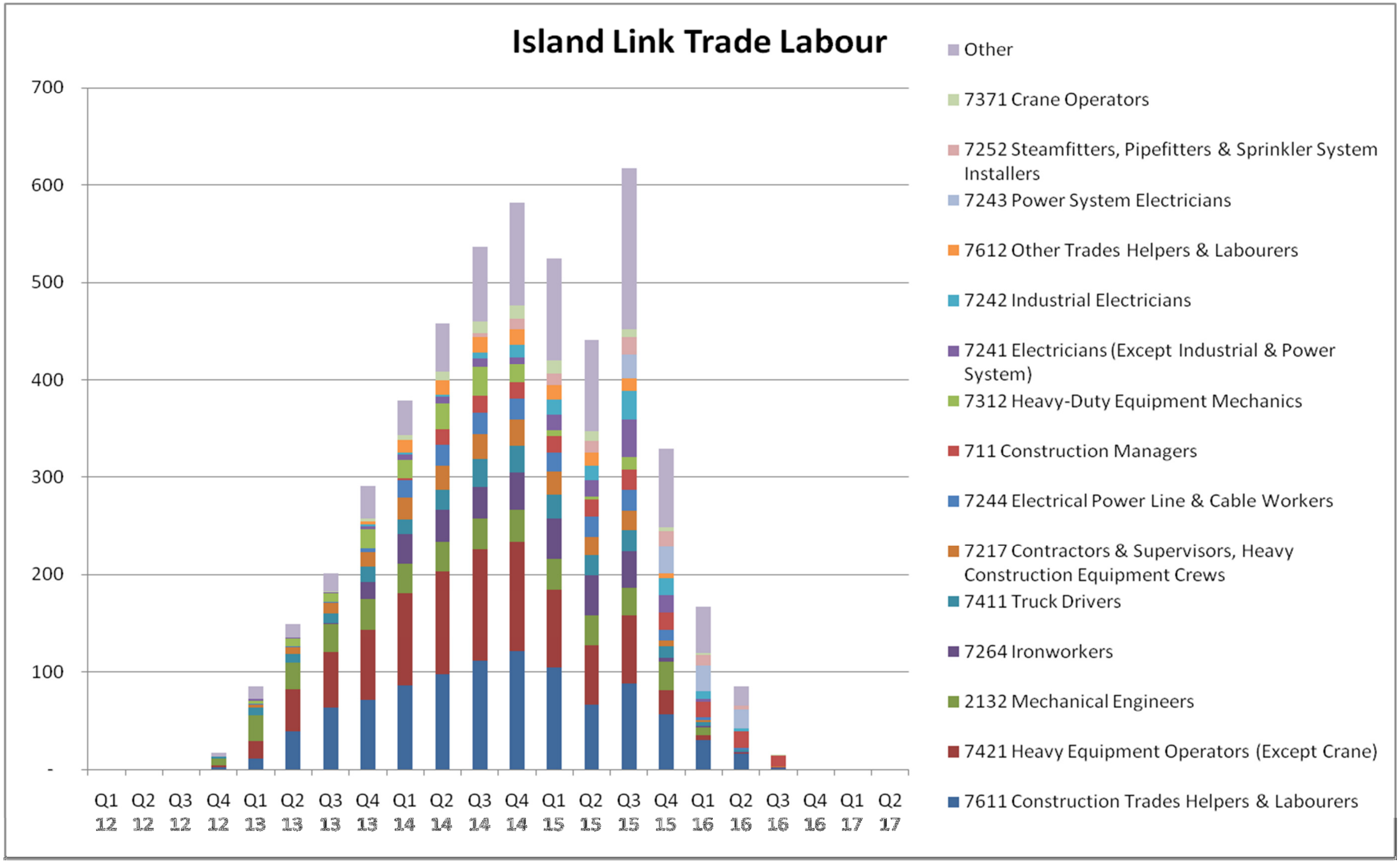


Figure 11: Trade Labor Histogram for Labrador – Island Transmission Link



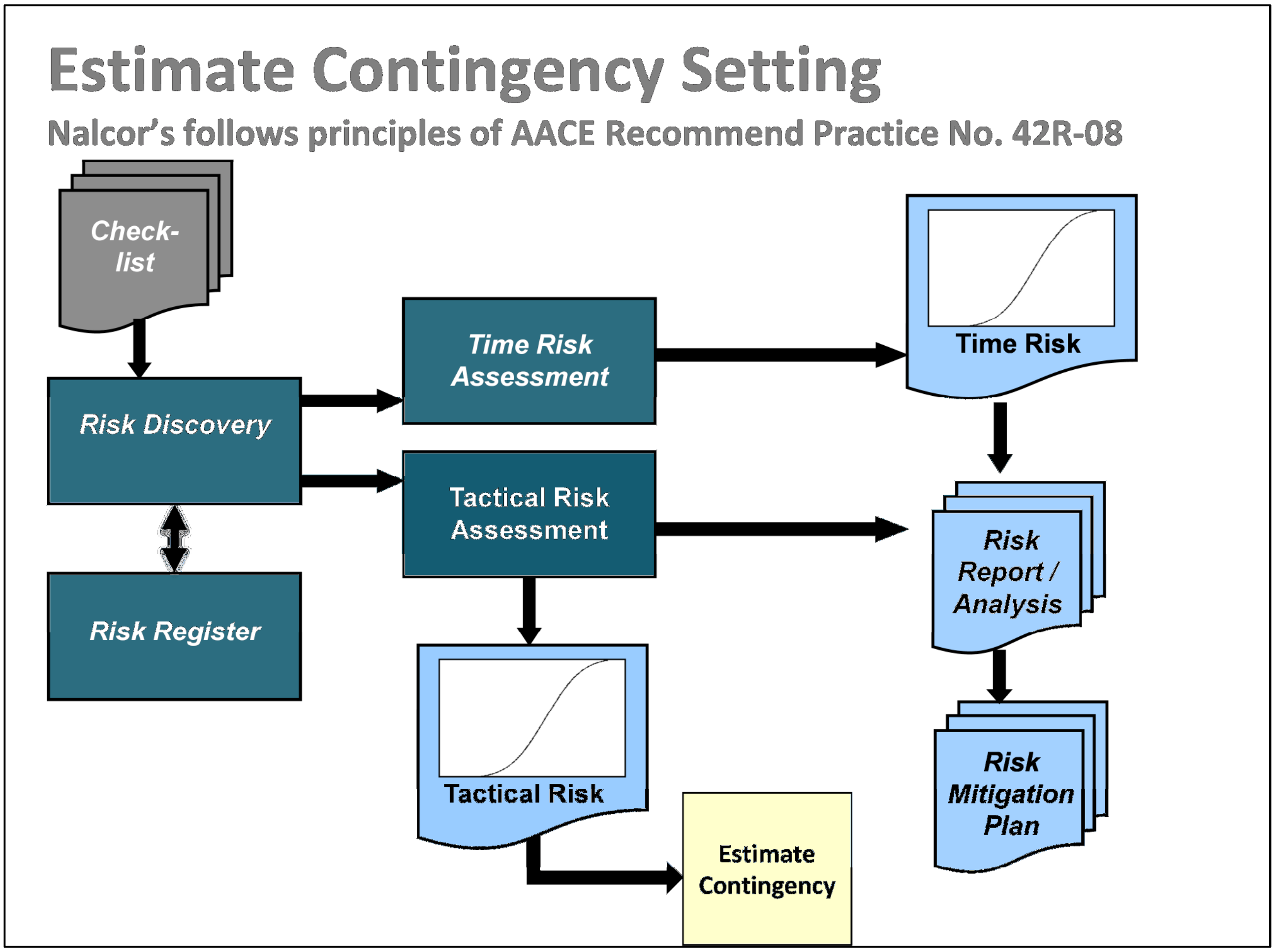
10.0 Component B: Estimate Contingency

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:

<u>Project Components</u>

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

<u>Base Estimate (2010 CDN $)</u>

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).

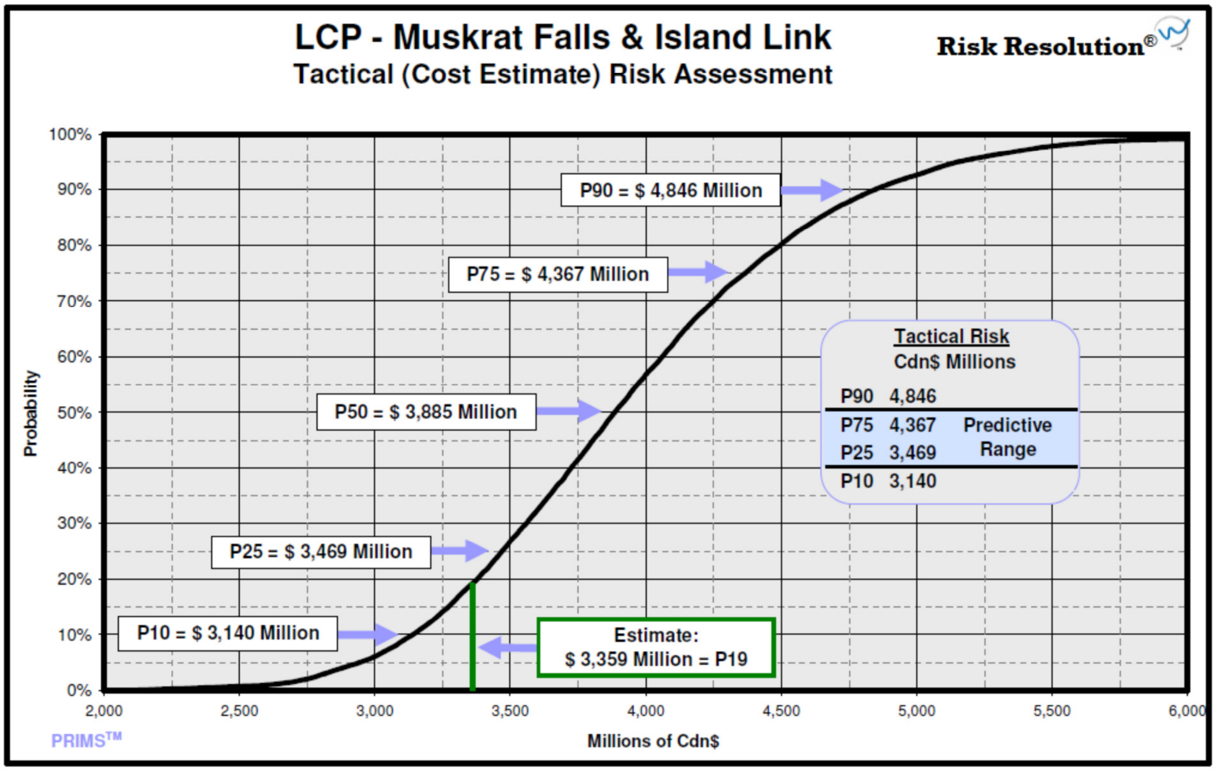
10.3 Results from Tactical Risk Assessment

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.

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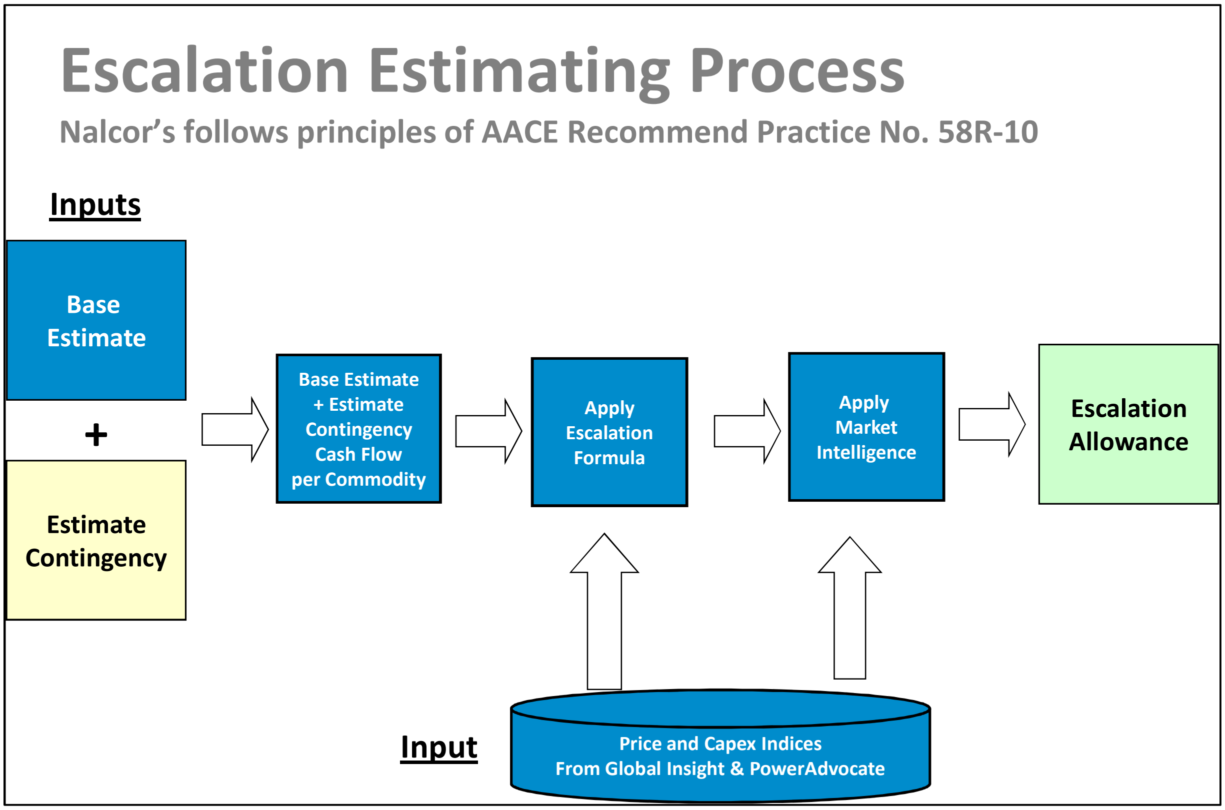
[1] Validation Estimating has provided services to numerous large companies, including Aramco, BP, Black & Veatch, Chevron, Dow Corning, Eastman, Enbridge, Manitoba Hydro, Ontario Power, Petro-Canada, Rio Tinto Alcan, and Suncor among others.

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



Escalation Estimating Process

Nalcor's follows principles of AACE Recommend Practice No. 58R-10

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.

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[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.

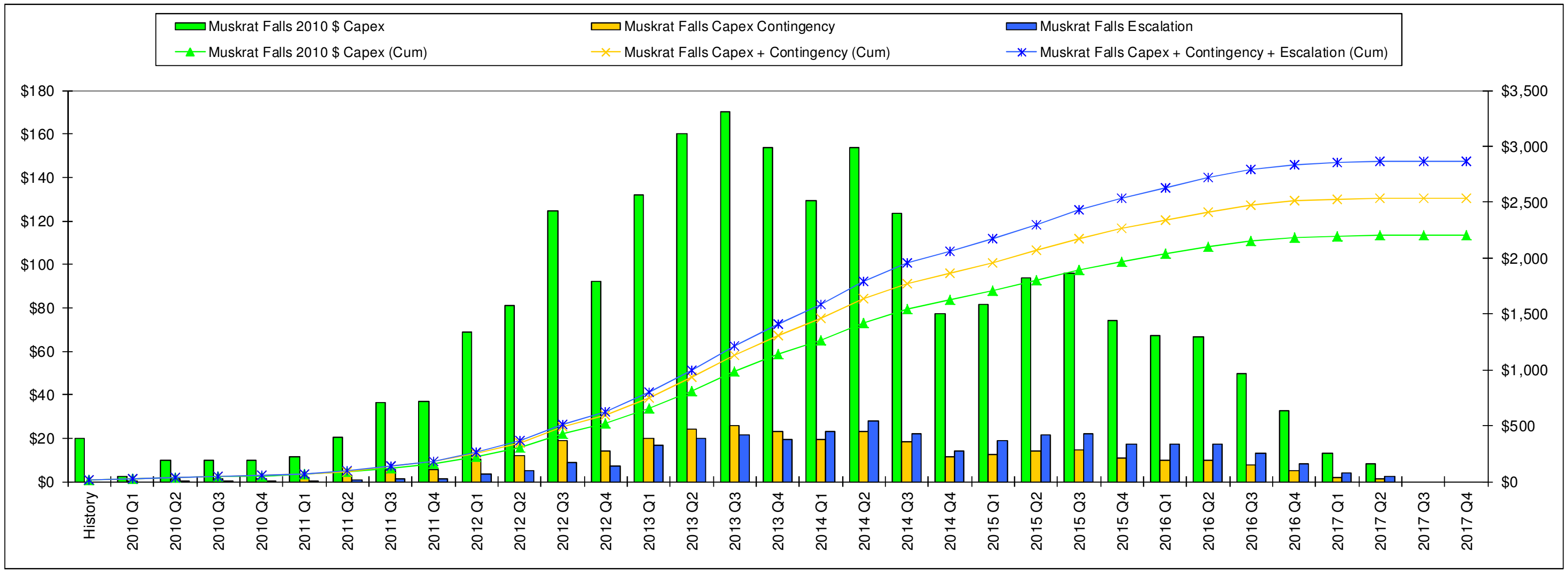
Table 6: Summary of MF and LIL Capital Cost Estimate

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:

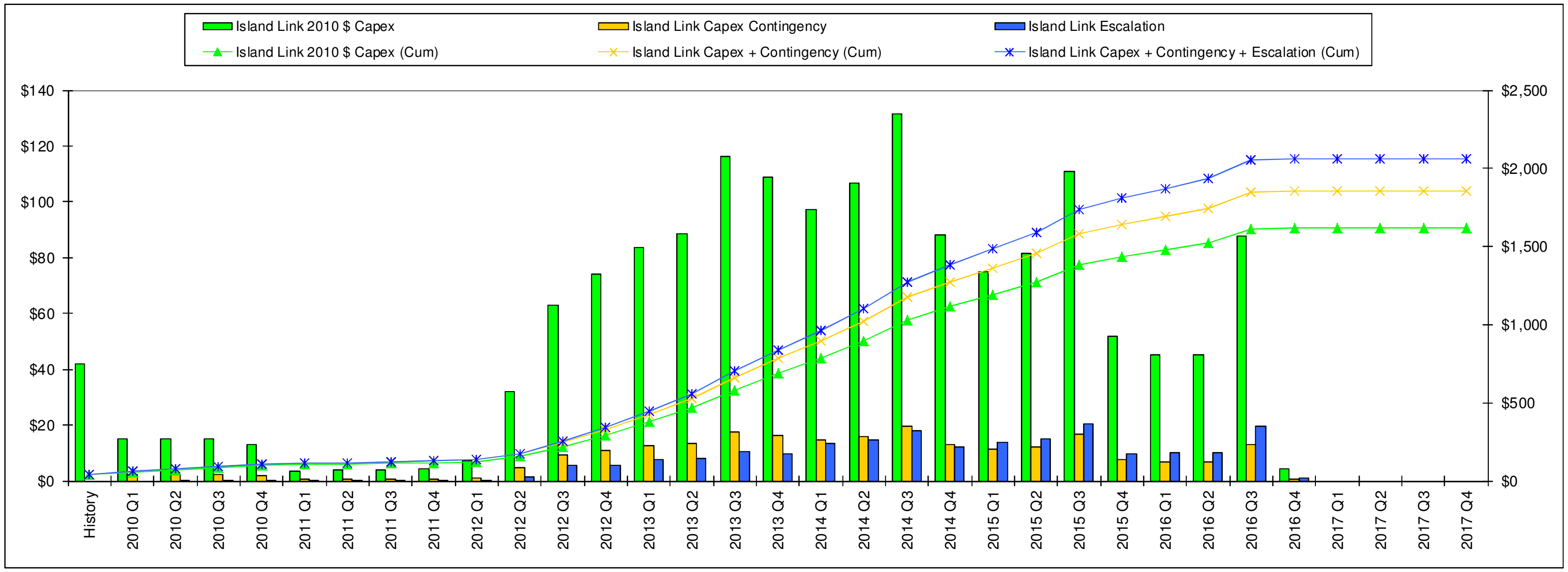
1. All costs in millions Jan 2010 CDN $
2. Estimate Contingency = 15% of Adjusted Base Cost
3. Escalation and Contingency are applied to Adjusted Base Cost

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	