

Lower Churchill Project 3 -Project Delivery Model and Organization June 2018

Boundless Energy



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Integrated LCP Team PM model

Project delivery model considerations

Key PM 'drivers' developed in 2007/2008

**Owner control
and capability**

- Intelligently size the owner managed team to ensure strong owner influence

Financing

- Engage engineering and support companies with strong reputations to provide "name recognition"

**Market
Conditions**

- Contractor capability and capacity

**Market
participation**

- Contractor desires and willingness to do the project

Risk management

- Appropriately allocate risk

**Front End Loading
(FEL)**

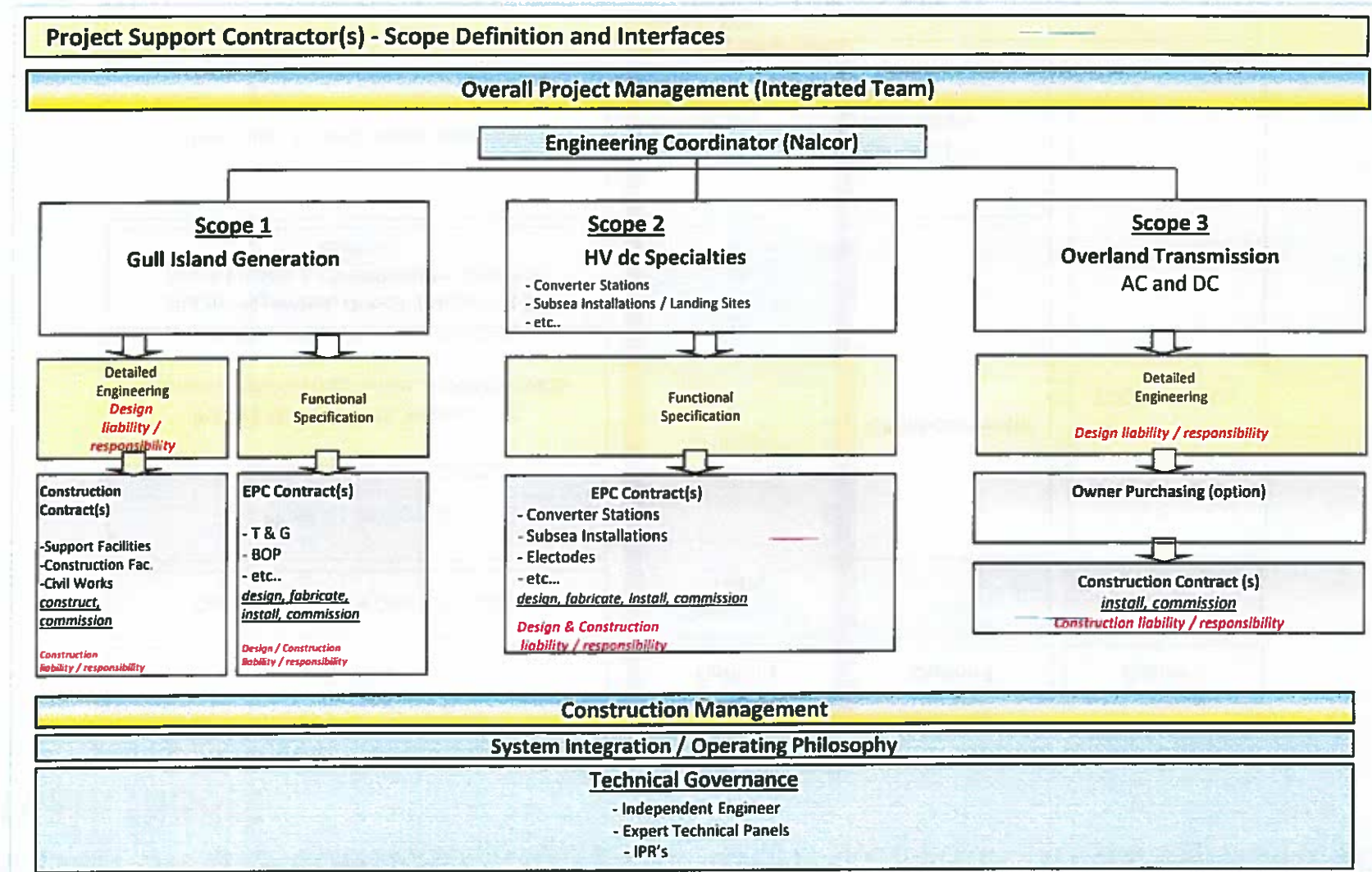
- Optimize definition and planning

* PM drivers shown are representative, and not exhaustive



Based on the considerations the team to select an integrated LCP Team model

2007/2008			
Activity	Option 1	Option 2	Option 3
Oversight / Project Controls / Audit	Integrated LCP Team	LCP	LCP
Phase 3 Engineering	Engineering Contractor	EPCM Contractor	EPC Contractor
Project Management, engineering, procurement, cost/schedule, project services			
Site management, Overall Labour Set Up (work planning, co-ordination, approval, control)			
Labor issues / construction supervision	Construction Contractors	Construction Contractors	
Contract Types - Procure / Construct; Construct; EPC (e.g. T&G)			

The organizational approach supported the execution plan



The approach was documented in the “Lower Churchill Project: Project Management Approach and Contracting Strategy”

									
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An Expression Of Interest (EOI) was issued, and signalled a preference for an EPCM model

EOI issued 25 February 2009

- An EOI for “Engineering Design and Project Support” was issued to:
 - SNC-Lavalin Inc.
 - Black and Veatch
 - Hatch
 - URS – Washington Group
 - Bechtel
 - MWH
- Scope – perform engineering design services, and provide other personnel to bolster the Nalcor-led Integrated Management Team

Responses to EOI received 14 April 2009

- In general, respondents indicated support for the Integrated Project Management Team (PMT)
- However, the submissions did not fully align with the concept
- **Contractors were more experienced in/aligned to an EPCM model and leaned toward providing all of their own methods, systems, processes, procedures, tools, support services, and general “know-how”**
- Contractor responses indicated slackening of resource restrictions in place pre-2008 – with greater assurance that experienced teams now available
- Bechtel was not aligned – proposed Project Delivery Partner approach

Development of the EPCM PM model

Why we changed to the EPCM model

	Integrated LCP Team	EPCM Model
Owner control and capability	<ul style="list-style-type: none"> High control – capacity to be built into organization 	<ul style="list-style-type: none"> High degree of control maintained Lower risk of capacity concern & Crown Corp. decision making
Financing	<ul style="list-style-type: none"> Owner input seen as good, but uncertain of model awareness 	<ul style="list-style-type: none"> More awareness of model by financiers
Market Conditions – capability / capacity	<ul style="list-style-type: none"> Better fit to capacity in the late 2000's Could need multiple contractors 	<ul style="list-style-type: none"> Concerns given size of the project Inserted flexibility in contract Market softening
Market participation	<ul style="list-style-type: none"> Market less inclined to participate 	<ul style="list-style-type: none"> More desirable in the market
Risk management	<ul style="list-style-type: none"> Large portion of risk passed to designer & construction contracts Owner oversight reduces risk 	<ul style="list-style-type: none"> Same risk of design & construction Owner input diminished but EPCM systems more proven
Front End Loading (FEL)	<ul style="list-style-type: none"> Allowed for early design and construction planning to reflect diverse components 	<ul style="list-style-type: none"> Maintained early design and most flexibility around components

Based on the new considerations the decision was made to change to an EPCM model

2009			
Activity	Option 1	Option 2	Option 3
Oversight / Project Controls / Audit	Integrated LCP Team	LCP	LCP
Phase 3 Engineering	Engineering Contractor	EPCM Contractor	EPC Contractor (Not practical in the market)
Project Management, engineering, procurement, cost/schedule, project services			
Site management, Overall Labour Set Up (work planning, co-ordination, approval, control)			
Labor issues / construction supervision	Construction Contractors	Construction Contractors	
Contract Types - Procure / Construct; Construct; EPC (e.g. T&G)			

An RFP was issued - SNC was selected as the EPCM contractor

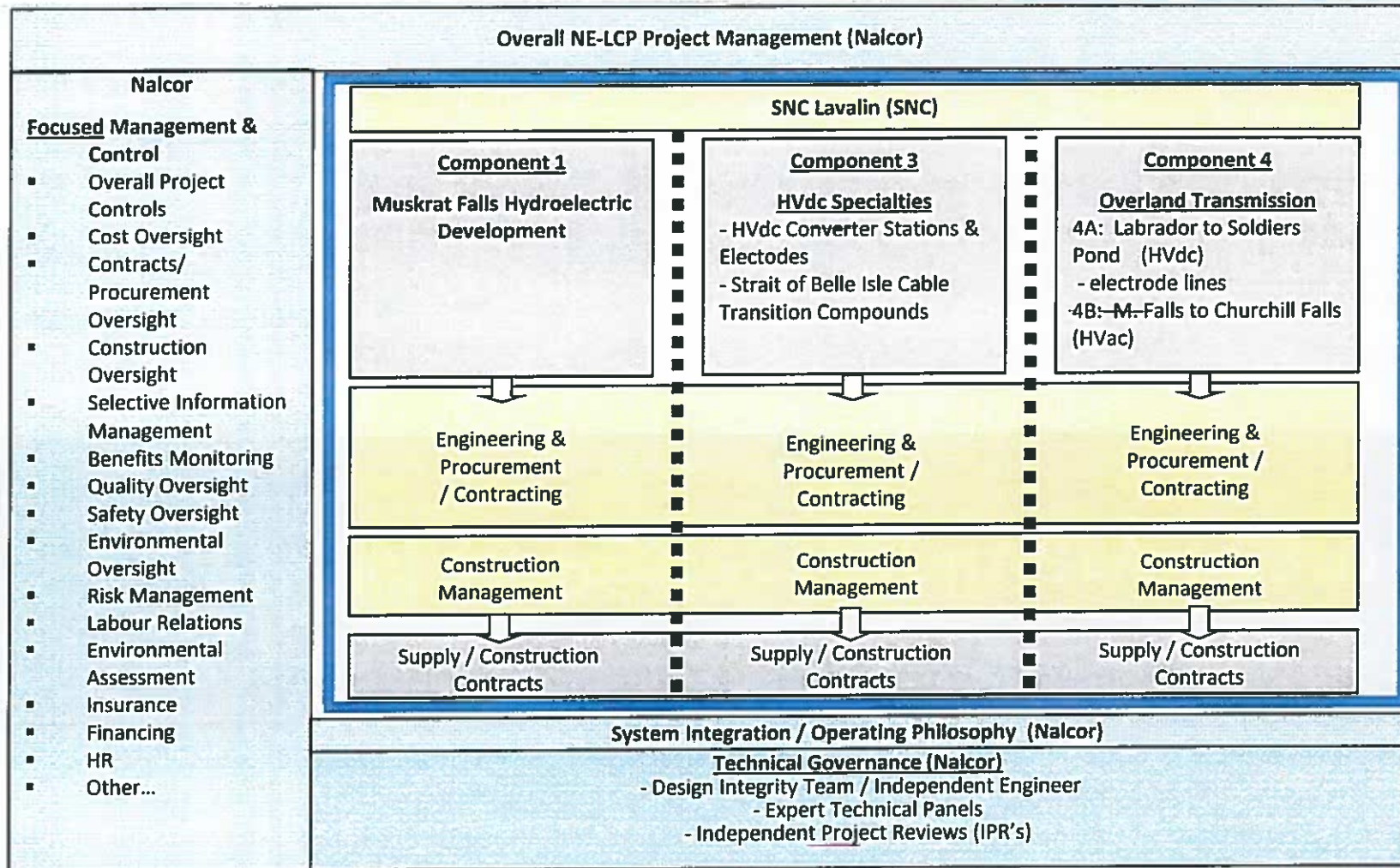
RFP was issued in July 2010

- An RFP for "Engineering, Procurement and Construction Mgt. Services " was issued to:
 - SNC-Lavalin Inc.
 - Black and Veatch
 - Hatch
- Scope – EP & CM functions provided by contractors
- Nalcor to maintain overall control of the Project by focused "management" of EP and CM entities
- EPCM takes advantage of capabilities of the bidders i.e. opportunity to avail of existing EP strengths and to potentially strengthen weak Construction Management
- Right to award:
 - full EPCM
 - EP or CM to one or more bidders (i.e. for all or separate project components)
 - EP with option to award CM later
 - EP with option to re-bid for CM later

SNC was selected

- SNC-Lavalin Inc. selected as EPCM contractor
- Letter of Intent issued December 2010
- Formal EPCM Agreement signed February 2011

The overall NE-LCP project management structure was defined with Nalcor and SNC responsibilities and interfaces



EPCM to Project Delivery Team

EPCM Phase

- 2011/2012 revealed serious SNC-Lavalin Inc. organizational and performance issues jeopardizing project delivery
- Best-for-project solution was to avail of Nalcor and SNC Lavalin Inc. combined strengths, supplemented with resources from other consultants (Hatch, Stantec, AMEC, agencies, etc.)
- Resulted in organizational model change - fully integrated 'Project Delivery Team' - agreed by Nalcor executive

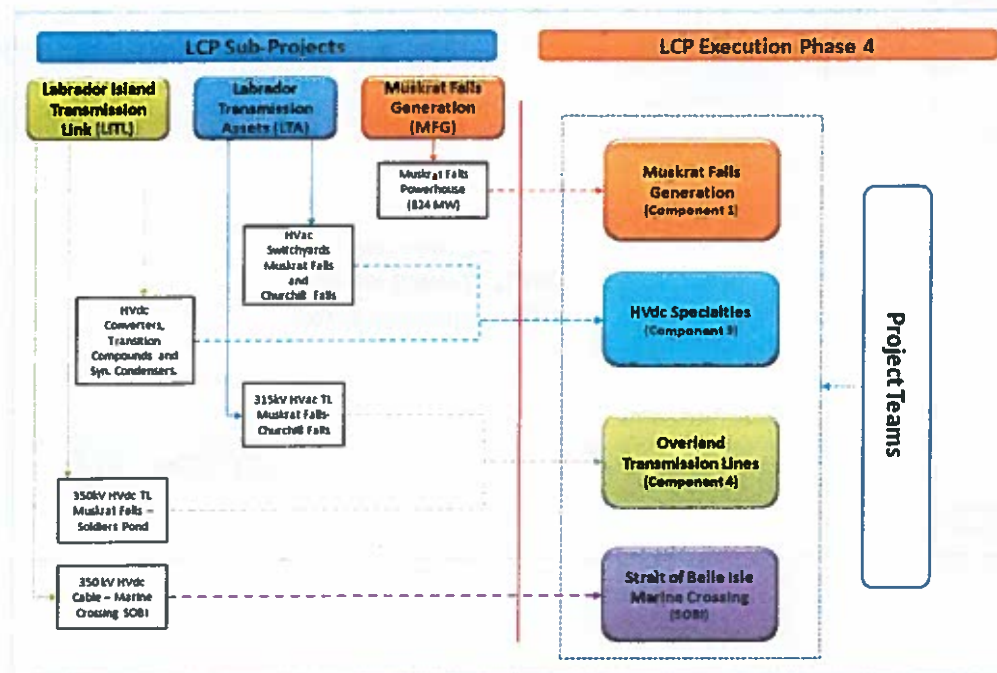
“One Team – One Vision”

Several organizations are represented in the Delivery Team

1. Nalcor employees
2. Agencies and misc. consulting companies
3. SNC
4. Hatch
5. Stantec
6. AMEC
7. PMX
8. Long International
9. Transgrid
10. Granite Infrastructure Constructors
11. LDV Consultants
12. Tiller Engineering
13. Vigilant Management
14. Worley Parsons



The organization model was designed to reflect the execution and contracting strategy around components and SPV's¹



Nalcor Energy – Lower Churchill Project



PROJECT EXECUTION PLAN (SCOPE AND APPROACH)

Nalcor Doc. No. LCP-PT-MD-0000-PM-PL-0001-01

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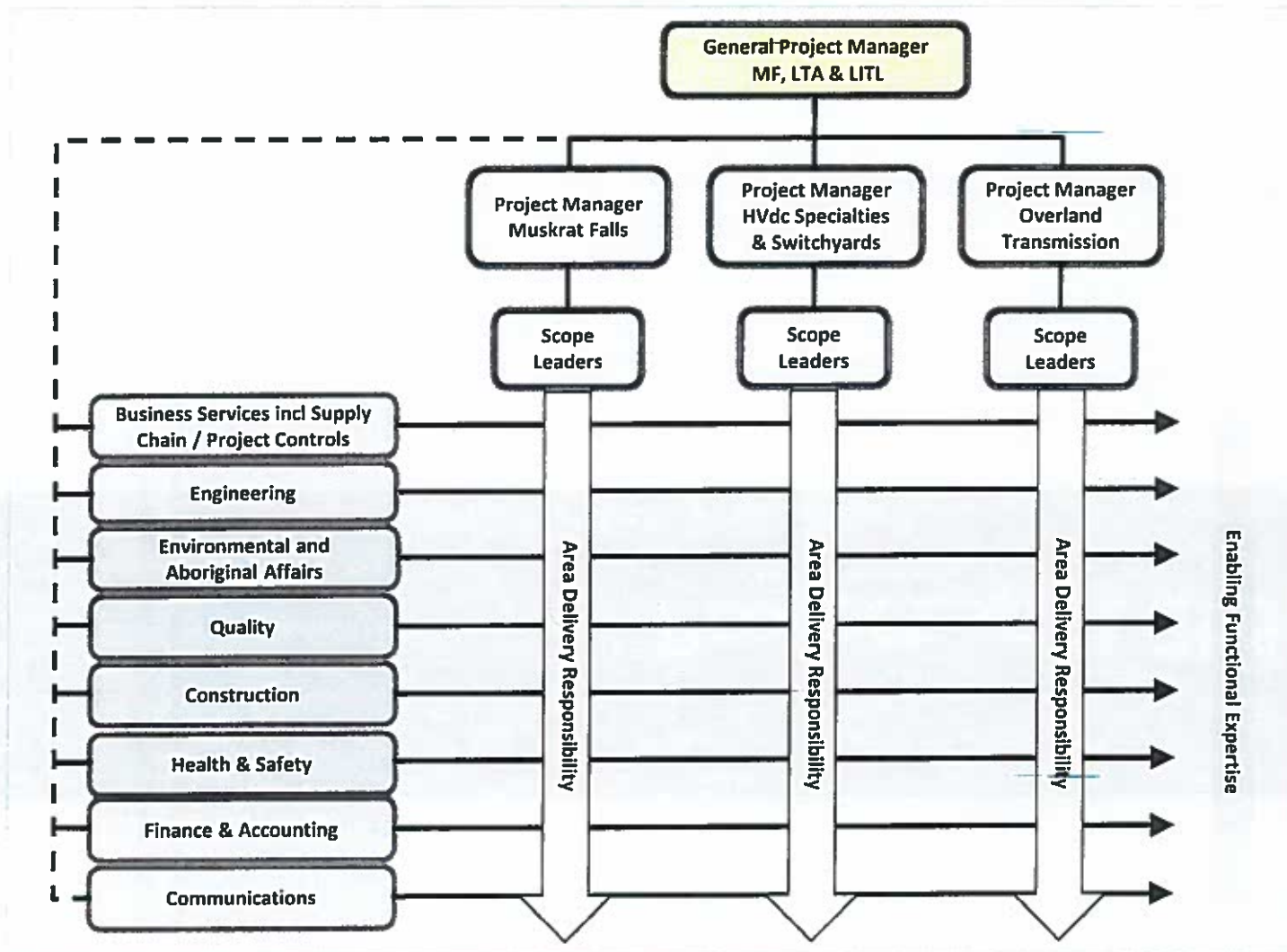
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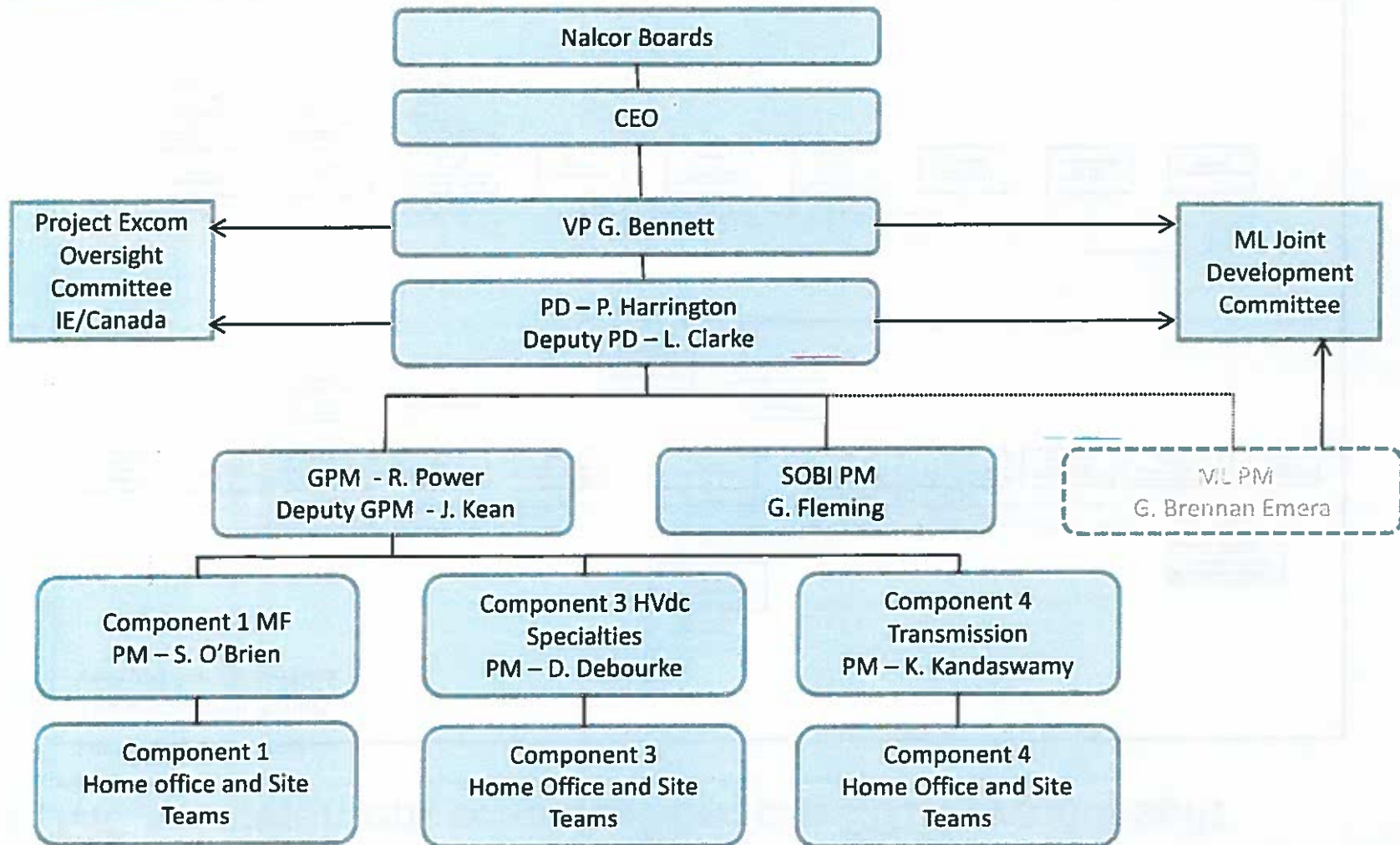
1 SPV = Special Purpose Vehicle

Matrix organization of functions and support teams



Project split 2016

High level LCMC overview: pre-2016 project split



LOWER CHURCHILL PROJECT



IPA scored the LCP Team Development Index (TDI) as “good”

LCP TDI Is Good *LCP Project Team Is Integrated*

- Business and project objectives are clearly defined and communicated
- Project team is fully integrated with all functions that have influence on project success
- Roles and responsibilities are defined, and risks have been frequently assessed
- Nalcor's Gateway work process followed



♦ LCP Project

♦ Megaproject Average

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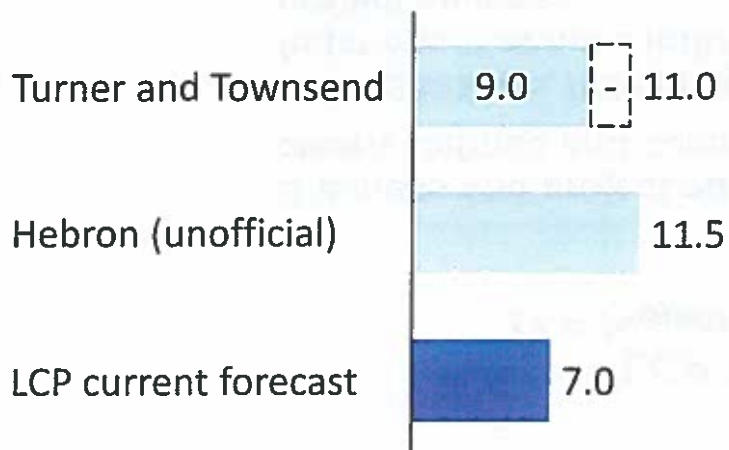
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INDEPENDENT PROJECT ANALYSIS

Several external sources validate the LCP integrated project management team's value and effectiveness

LCP total project mgmt. team costs (excl. engineering) are forecasted below benchmarks

Integrated project mgmt. team costs
% of total installed cost



Reviews of project team effectiveness have been positive

- Score of "good" (above average) by Independent Project Analysis (IPA)
- Multiple reports that support the project management structure (including move to the integrated project management team) by the Independent Engineer
- No reference to any recommended project management structure improvements by EY reviews
- ~30 Internal Audits

LCP Management Team: post-2016 project split



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LOWER CHURCHILL PROJECT

**Lower Churchill Management Corporation
Project Delivery Team
Organization Charts
Rev B10**

REVISED: 12 August 2016



