SNC·LAVALIN

nalcor energy

Lower Churchill Project

EPCM PROJECT EXECUTION PLAN

SLI Document No. 505573-0000-30PL-I-0002-00

Nalcor Reference No. LCP-SN-CD-0000-PM-PL-0002-01 Rev. B1

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REVISION LIST

Revision						
Nº	Prepared By:	Verified By :	Appr. By :	Date	Revised pages	Remarks
00	NG	NB/AH/LC	NB	11-JUN-2012	ALL	Issued with integrating client comments
PC	NG	FC/AH/LC	NB	30-MAR-2012	ALL	Issued for Client Review
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PA	BP	FC/AH/LC	JH	23-JUN-2011	ALL	Issued for Review

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APPENDIX A – RESPONSIBILITY MATRIX

APPENDIX B – ENVIRONMENTAL POLICY & GUIDING PRINCIPLES

1 PURPOSE

The Project Execution Plan (PEP) is a management control document issued to Nalcor and each EPCM team member. It provides the framework and approach for how SLI will plan, manage and execute the EPCM scope for the Lower Churchill Project during Phase 3 and Phase 4 of project execution.

This PEP is intended to guide and govern the SLI activities during the Engineering, Procurement and Construction Management (EPCM) execution of the Lower Churchill Project (LCP).

The PEP must be read in conjunction with the Project Instructions Manual 505573-0000-30AG-I-0001 and the following Project specific reference documents developed as per Table 1.1 of the Project Agreement:

NAME	NALCOR DOCUMENT #	SLI DOCUMENT #
Project Organization Charts	LCP-SN-CD-0000-PM-PL-0003-01	505573-0000-30AG-I-0001
Technical Interface Management Plan	LCP-SN-CD-0000-EN-PL-0001-01	505573-0000-31RA-I-0003
Project Health and Safety Management Plan	LCP-SN-CD-0000-HS-PL-0001-01	505573-0000-68RA-I-0001
Project Quality Plan	LCP-SN-CD-0000-QA-PL-0001-01	505573-0000-38RA-I-0001
Project Purchasing Plan	LCP-SN-CD-0000-SC-PL-0001-01	505573-0000-52RA-I-0001
Project Contracting Plan	LCP-SN-CD-0000-SC-PL-0003-01	505573-0000-51RA-I-0001
Materials Management Plan	LCP-SN-CD-0000-SC-PL-0005-01	505573-0000-54RA-I-0001
Logistics Plan	LCP-SN-CD-0000-SC-PL-0006-01	505573-0000-55RA-I-0001
Cost Management Plan	LCP-SN-CD-0000-PC-PL-0001-01	505573-0000-34RA-I-0001
Project Change Management Plan	LCP-SN-CD-0000-PM-PL-0004-01	505573-0000-31RA-I-0001
Change Control Plan	LCP-SN-CD-0000-PC-PL-0002-01	505573-0000-31RA-I-0002
Risk Management Plan	LCP-SN-CD-0000-IM-PL-0001-01	505573-0000-39RA-I-0001
Design Verification Plan	LCP-SN-CD-0000-EN-PL-0002-01	505573-0000-40RA-I-0002
Engineering Management Plan	LCP-SN-CD-0000-EN-PL-0003-01	505573-0000-40RA-I-0003
Operations and Maintenance Plan	LCP-SN-CD-0000-OP-PL-0001-01	505573-0000-70RA-I-0001
Design – Construction Management Plan	LCP-SN-CD-0000-EN-PL-0004-01	505573-0000-40RA-I-0004
Construction Management Plan	LCP-SN-CD-0000-CS-PL-0001-01	505573-0000-60RA-I-0001
Site Security and Access Control Plan	LCP-SN-CD-0000-HS-PL-0003-01	505573-0000-60RA-I-0002
Project Completions Philosophy	LCP-SN-CD-0000-CM-PH-0001-01	505573-0000-70RA-I-0002
Commissioning Plan		TBD
Invoicing and Payment Plan	LCP-SN-CD-0000-FI-PL-0001-01	505573-0000-34RA-I-0003

NAME	NALCOR DOCUMENT #	SLI DOCUMENT #
Information Management Plan	LCP-SN-CD-0000-IM-PL-0002-01	505573-0000-37RA-I-0001
Regulatory Compliance Plan	LCP-SN-CD-0000-RT-PL-0001-01	505573-0000-68RA-I-0003
Environmental Management Plan	LCP-SN-CD-0000-EV-PL-0001-01	505573-0000-68RA-I-0004
Project-Wide Environment Protection Plan	LCP-SN-CD-0000-EV-PL-0002-01	505573-0000-68RA-I-0008
Project Wide Rehabilitation Plan	LCP-SN-CD-0000-PC-PL-0004-01	505573-0000-68RA-I-0007
Contract-Specific Environmental Protection Plan Template	LCP-SN-CD-0000-EV-PL-0003-01	505573-0000-68RA-I-0011
Schedule Development & Control Plan	LCP-SN-CD-0000-PC-PL-0003-01	505573-0000-32RA-I-0001-PA
Waste Management Plan		505573-0000-68RA-I-0008
Emergency Response Plan		505573-0000-68RA-I-0012
Project Control Schedule	LCP-SN-CD-0000-PC-SH-0001-01	505573-0000-32RA-I-0002
IT Management Plan		505573-0000-36RA-I-0001

These documents are available in the Project Document Management (PDM) network and are accessible from the electronic version of the PEP through hyperlinks.

The above project plans were developed to meet the requirements of the coordination procedures indicated in the Project Agreement. These project management plans link the requirements in the Project Agreement to the SNC-Lavalin project procedure and processes.

SNC-Lavalin will be executing the project based on the Global M&M Project Procedures, Processes and Tools. The Project Instructions Manual provides the direction to all Project Personnel on the specific project procedures, processes and forms that will be used to execute all aspects of the work. Where gaps are identified between the Project Agreement, Project Management Plan and SLI Procedures, specific Project Instructions will be issued and the Project Instructions Manual updated and issued to all members of the team.

2 DEFINITIONS

BASELINE	The project scope, in terms of quantity, quality, timing, hours, costs, etc. that establishes a formal reference for comparison and verification of subsequent efforts, progress, analysis and control.
COMPONENT	The initial framing of the LCP considered three major work elements, Power Generation, HVdc Specialties, and Overland Transmission, which are referred to as "Components." These distinct work elements helped to focus attention on the engineering and technical competencies required to deliver the overall Project.
DECISION GATES	A Decision Gate is a predefined moment in time where the Gatekeeper has to make appropriate decisions where 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
EPCM	The supply of Engineering, Procurement and Construction Management Services.
GATE KEEPER	The person responsible for making the decision at the Decision Gate of the Gateway Process.
KEY DELIVERABLES	High-Level listing of key outputs/documents which collectively demonstrate that objectives have been attained.
RISK	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
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

3 ABBREVATIONS AND ACRONYMS

CAR	Corrective Action Request
CRC	Commodity Resource Coding
C-SEPP	Contract Specific Environment Protection Plan
FAT	Factory Acceptance Test
EPCM	Engineering, Procurement and Construction Management
EMP	Environmental Management Plan
HR	Human Resources
HVac	High Voltage Alternating Current
HVdc	High Voltage Direct Current
ITP	Inspection and Test Plan
KV	Kilovolt
KPI	Key Performance Indicators
LCP	Lower Churchill Project
MFL	Manpower Forecasting and Leveling
MW	Mega Watt
NDT	Nondestructive Testing
PAA	Personal Assignment Authorization Form
PAR	Preventative Action Request
PCM	Project Controls Manager
PDM	Project Document Management
PEP	Project Execution Plan
PMO	Project Management Office
P-WEPP	Project Wide Environmental Protection Plan
OSEM	On Site Environmental Monitors
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
RCC	Roller Compacted Concrete
RMP	Risk Management Plan
SDRL	Supplier Data Requirements List
SOBI	Strait of Bell Isle
WBS	Work Breakdown Structure

4 PROJECT DESCRIPTION

The project under development is comprised of the Muskrat Falls Hydroelectric Plant and associated transmission lines and DC specialties. It is comprised of three discrete physical Components, as follows:

- Component 1: Muskrat Falls Hydroelectric Development
- Component 3: High voltage direct current transmission system specialties
- Component 4: High voltage overhead transmission lines (ac and dc) including:
  - Sub-component 4A: HVdc overhead transmission lines Muskrat Falls to Soldiers Pond
  - Sub-component 4B: HVac overhead transmission lines Muskrat Falls to Churchill Falls

Component 2 is the subsea cable across the Strait of Bell Isle and is not part of the SLI scope.

Figure 4-1 below pictorially presents the Lower Churchill Phase 1 Development with associated components indicated.

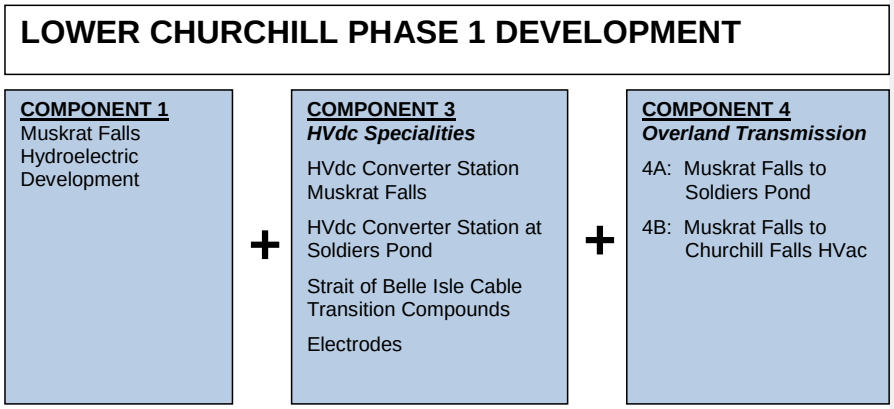

Figure 4-1: Lower Churchill Phase 1 Development

The Lower Churchill Project Basis of Design can be found in LCP-PT-ED-0000-EN_RP-0001-01.

4.1.1 Component 1 – Muskrat Falls Hydroelectric Development

The Muskrat Falls Hydroelectric Development will include the following sub-components which are broken down under the five principal areas of the development.

Infrastructure

a) 34 km of access roads, including upgrading and new construction, and temporary bridges spanning the approach channel of the spillway;

b) A 1,500 person accommodations complex (for the construction period); and

c) Upgrade of port facilities at Happy Valley Goose Bay and Cartwright.

Dams and Spillway

a) A north roller compacted concrete (RCC) overflow dam;

b) A south Rockfill dam;

c) River diversion during construction via natural river channel for first two years and via the spillway for subsequent years;

d) Gated spillway.

Reservoir

a) Reservoir preparation;

b) Replacement fish habitat;

c) North spur stabilization.

Intake / Powerhouse / Turbine Generator

- A close coupled intake and powerhouse, including:
  - 4 intakes with gates and trash racks;
  - 4 turbine/generator units at approximately 206 MW each with associated ancillary electrical/mechanical and protection/control equipment;
  - 5 power transformers (includes 1 spare), located on the draft tube deck of the powerhouse;
  - 2 overhead cranes.

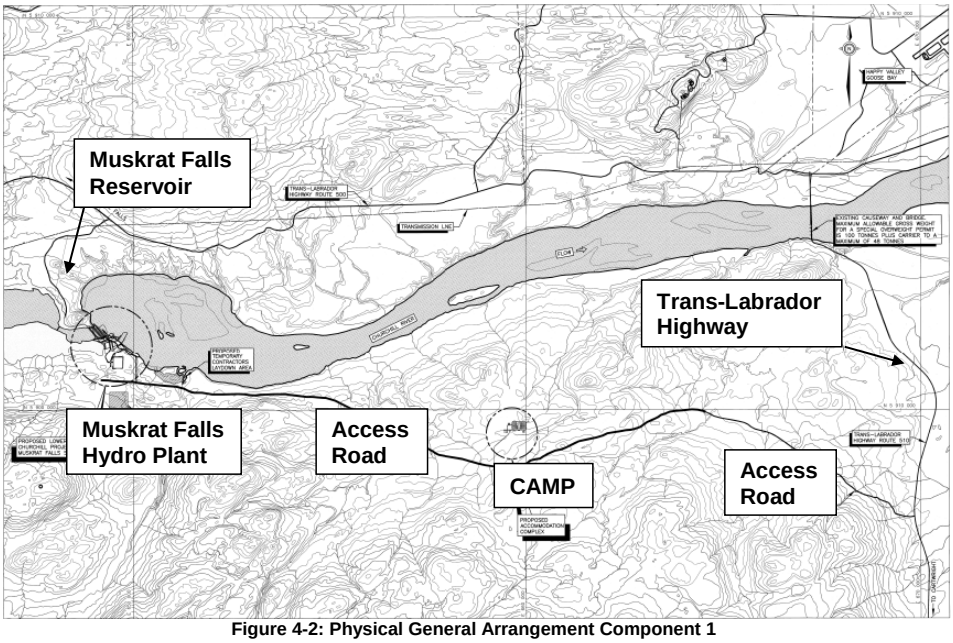

Figure 4-2: Physical General Arrangement Component 1

4.1.2 Component 3 – High Voltage Direct Current Transmission System Specialties

Component 3 consists of the HVdc converter station systems associated with the high voltage direct current (HVdc) transmission system. The Component 3 HVdc facilities will comprise the following:

a) Muskrat Falls HVdc converter station:
- HVdc bipolar converter station;
- 315 kV ac, converted to ±350 kV dc;
- Pole capacity of 450 MW; and
- Shoreline pond electrode located on the Labrador side of the Strait of Belle Isle.

The shoreline pond electrode will be connected to the converter station at Muskrat Falls with dual overhead conductors on the HVdc Transmission Line and a wood pole line which will form part of Component 4.

b) Soldiers Pond HVdc converter station:
- HVdc bipolar converter station;
- 230 kV ac, converted from ±350 kV dc;

- Pole capacity of 450 MW; and
- Shoreline pond electrode located on the east shore of Conception Bay.

The shoreline pond electrode will be connected to the converter station at Soldiers Pond with dual overhead conductors supported on a wood pole line. The wood pole line and conductors will form part of Component 4.

c) HVdc Transition Compounds for the Strait of Belle Isle submarine cable terminations:
   - One transition compound for each side of the Strait of Belle Isle submarine cable crossing,
   - Associated switch works to manage the junction of multiple submarine cables and the overhead transmission line.

d) Substations
   - Churchill Falls Switchyard Extension; 315 to 735 kV
   - AC Switchyard at Muskrat Falls; 315 kV including 138kV to Happy Valley Goose Bay
   - AC Switchyard Soldiers Pond, 230 kV

e) Telecoms.

For the purposes of the EPCM Contract, the scope of work includes both the construction and the permanent telecom for the Project but does not include any infrastructure or services associated with the actual crossing of the Strait of Belle Isle.

Figure 1-3 presents the preliminary physical general arrangement of Component 3 the HVdc Specialties associated with the overall LCP

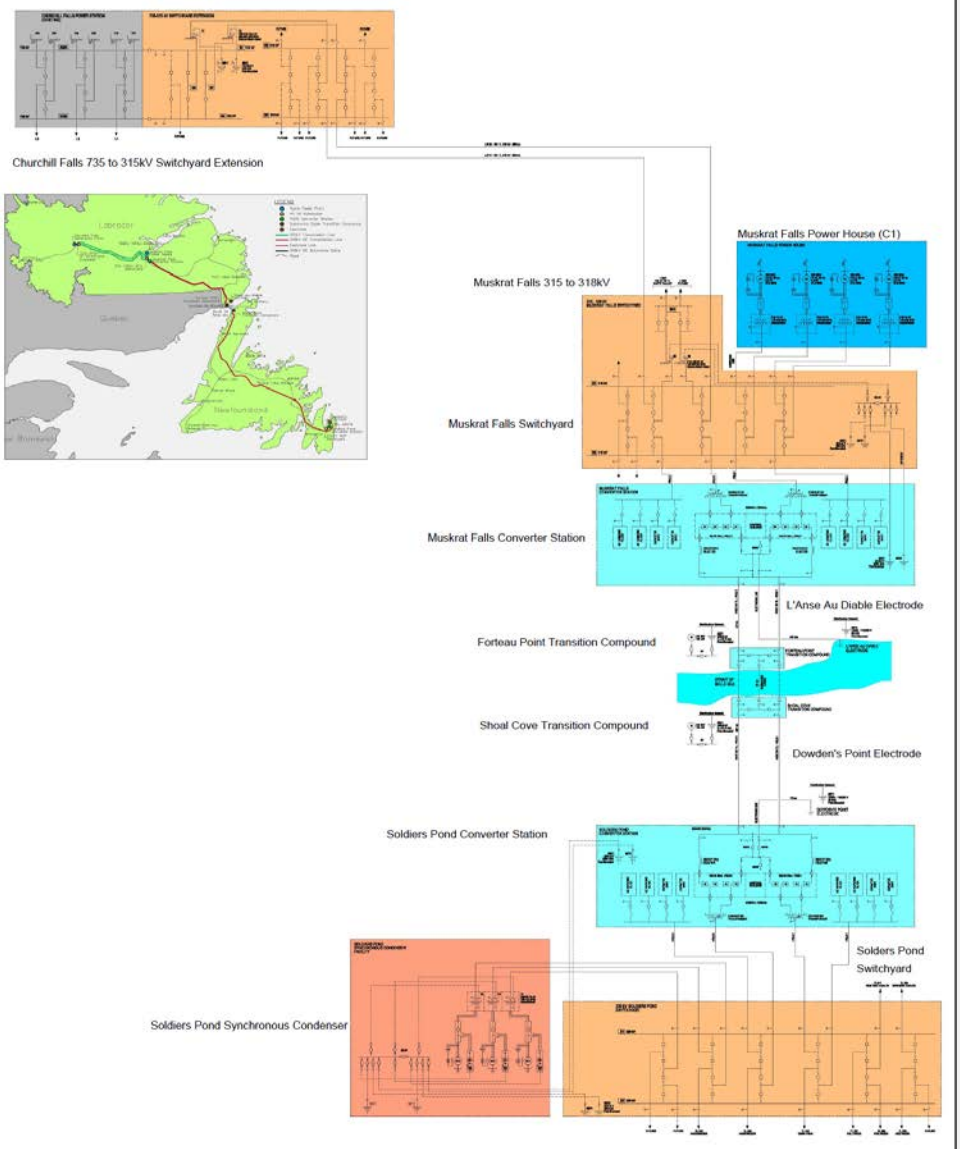

Figure 4-3: Physical General Arrangement Component 3

4.1.3 Component 4 – High Voltage Overhead Transmission Lines

The high voltage overhead transmission lines required for the Project comprise high voltage alternating current (HVac) lines, high voltage direct current (HVdc) lines, and electrode lines described as follows:

Sub-Component 4A: HVdc Overhead Transmission Lines Muskrat Falls to Soldiers Pond

a) Overhead Transmission Line:
Transmission line from Muskrat Falls converter station to Soldiers Pond converter station (near St. John's, NL):
- 900 MW, ±350 kV dc, bipole line, single conductor per pole;
- Galvanized lattice steel guyed suspension and rigid angle towers;
- 1100 km long;
- Re-termination of 240KV existing lines at Soldier's Pond

Connections to HVdc transmission system specialties installations, as described in Component 3 herein, will be required.

b) Electrode Lines:
- Dual overhead conductors supported on a wood pole line from North of Strait of Belle Isle to the shoreline pond electrode located in L'Anse au Diable;
- Dual overhead conductors supported on a wood pole line from Soldiers Pond converter station to the shoreline pond electrode located on the east shore of Conception Bay.

Sub-Component 4B: HVac Overhead Transmission Lines Muskrat Falls to Churchill Falls

Churchill Falls

Transmission lines from Muskrat Falls to Churchill Falls:
- 2 – 315 kV ac, 3 phase lines, double bundle conductor;
- Single circuit galvanized lattice steel guyed suspension and rigid angle towers;
- 250 km long.

Transmission lines connection from existing substation to proposed substation extension at Churchill Falls:

- 2 – 735 kV ac, 3 phase lines, approximately 700 m

Transmission line connection from new proposed power house to proposed substation at Muskrat Falls:

- 4 – 315 kV ac, 3 phase lines, approximately 500 m.

Figure 4-4 below presents the physical arrangement of Component 4 - the transmission facilities associated with the overall LCP.

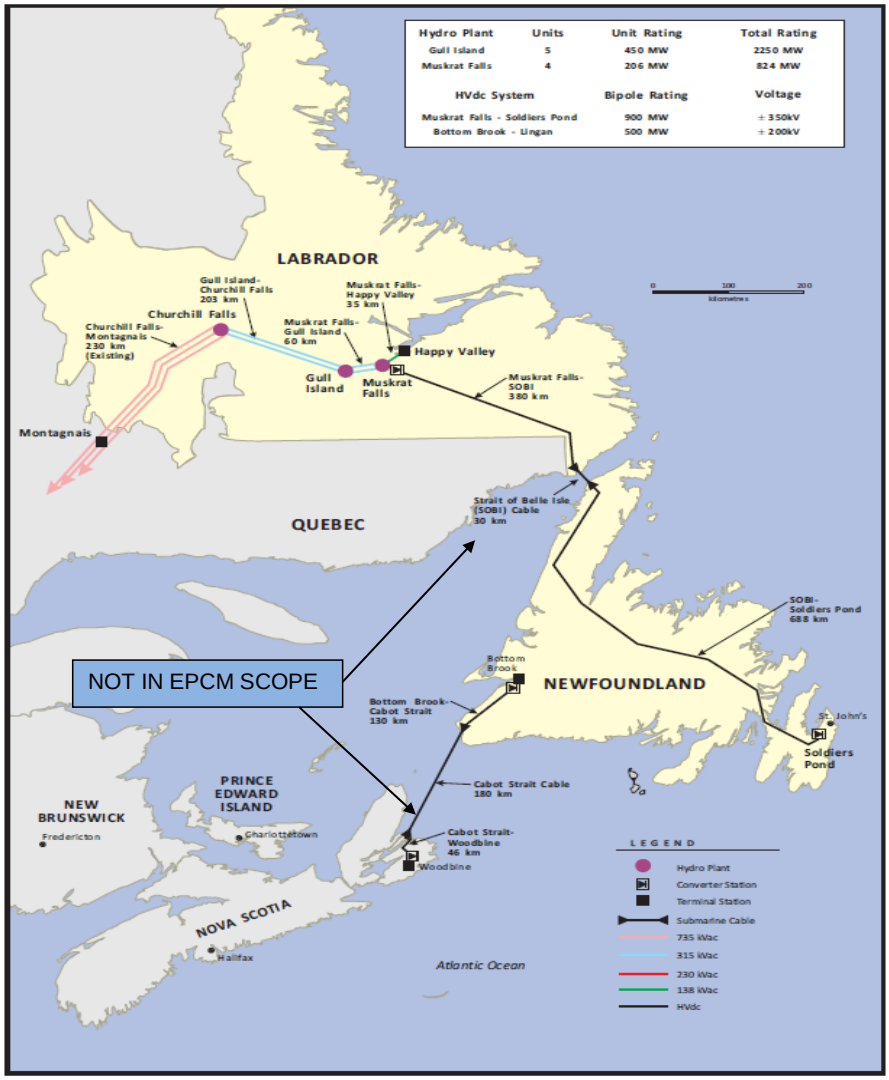

Figure 4-4: Physical Arrangement of Transmission Facilities

4.2 PROJECT OBJECTIVES

The objectives of the work to be carried out under the EPCM Contract are:

- Provide quality services that will:
- Lead to “flawless execution” of the work;
- Deliver a commissioned generating plant, associated transmission lines and DC specialties that will meet or exceed design capacity;
- Meet all of the health, safety, environment and sustainable development commitments set for the project;
- Achieve project delivery within the established control schedule and budget;
- Maximize local content and First Nations’ involvement and create a positive relationship with local communities in Labrador; and
- Achieve Best Value for the Project and the chosen development option.

The work is to be carried out in accordance with the Project Milestone Schedule 505573-0000-32RA-I-0002. The services will include engineering, procurement, construction management, and other project management services to satisfactorily meet project requirements.

SNC-Lavalin undertakes, in performing the services, to fully cooperate and actively participate with Nalcor in seeking ways to achieve best value for the Project.

SNC-Lavalin and Nalcor negotiated the EPCM Agreement with the following principles as consideration for guidance during execution:

- Successful delivery of the Project;
- Corporate and staff commitment to project success;
- Parties will be solution oriented, not problem focused;
- Parties will be mutually collaborative and supportive;
- Philosophically, contract changes between the parties will not be a focus item; and;
- Engineering will be executed in Newfoundland and Labrador.
- Specialized engineering may occur outside the province subject to Nalcor approval.

Throughout the provision of Services, it is expected that SNC-Lavalin and Nalcor will espouse the following core values:

- Open Communication - Fostering an environment where information moves freely in a timely manner;
- Accountability - Holding ourselves responsible for our actions and performance;
- Safety - Relentless commitment to protecting ourselves, our colleagues, and our community;
- Honesty and Trust - Being sincere in everything we say and do;
- Teamwork - Sharing our ideas in an open and supportive manner to achieve excellence;
- Respect and Dignity - Appreciating the individuality of others by our words and actions and;
- Leadership - Empowering individuals to help guide and inspire others.

4.3 EPCM SCOPE AND APPROACH

Phase 1 of the Lower Churchill Development comprises the Muskrat Falls Development and the associated transmission lines and DC specialties necessary to transmit the power to market. The Muskrat Falls site has a nominal potential generating capacity of 824 MW.

4.3.1 Project Agreement

The contract for the EPCM work is set out in Agreement LC-G-002 between Nalcor Energy and SNC-Lavalin Inc. The agreement was made effective as of the 1st day of February, 2011.

The work will be carried out under SNC-Lavalin Project Number 505573. The work will be executed through project offices in St. John's, Newfoundland with the support of three SNC-Lavalin business units, i.e., the Hydro and Power Systems Division (Montreal), the Transmission and Distribution Division (Montreal, Toronto and Calgary) and BAE Newplan Group Inc. (Mount Pearl).

The Nalcor contacts for the Project are:

Nalcor Energy
Lower Churchill Project
P.O. Box 12800, 500 Columbus Drive
St. John's, NL A1B 0C9
Attention: Ron Power
General Project Manager – EPCM Contract
E-mail: ronpower@nalcorenergy.com

Phone: (709) 746-8498
Fax: (709) 737-1985

Attention: Clarence Hewitt
Contract Administrator
E-mail: clarencehewitt@nalcorenergy.com
Phone: (709) 737-1385
Fax: (709) 737-1985

The SNC-Lavalin contacts for the project are:

SNC-Lavalin Inc.
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350 Torbay Rd, Suite 2
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General Project Manager
E-mail: Normand.Bechard@snclavalin.com
Phone: (709) 752-3461, Extension 4810
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Attention: Ed Over
Procurement Manager
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Phone: (709) 752-3461, Extension 4809
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Attention: Brian Colbourne
Office Services and Administration
E-mail: brian.colbourne@snclavalin.com
Phone: (709) 752-3461, Extension 5005
Fax: (709) 752-3480

4.3.2 Scope of Work

In accordance with the project stage gate process as shown in figure 4-5 below;

SNC-Lavalin is responsible for carrying out and providing EPCM services for components 1, 3 and 4 as follows;

- Provide engineering services for Phase 3 – Engineering and Procurement / Contracting of the Lower Churchill. The achievement of Gate 3 (Refer to Figure 4-5) will enable the project to be sanctioned.
- Provide full EPCM services for Phase 4 – Engineering, Procurement, Construction Management and Commissioning of the Gateway Process. This is the execution phase of the project leading to a fully commissioned plant ready for start-up.

A detailed description of the scope of services can be found in the EPCM Agreement, Exhibit 3.

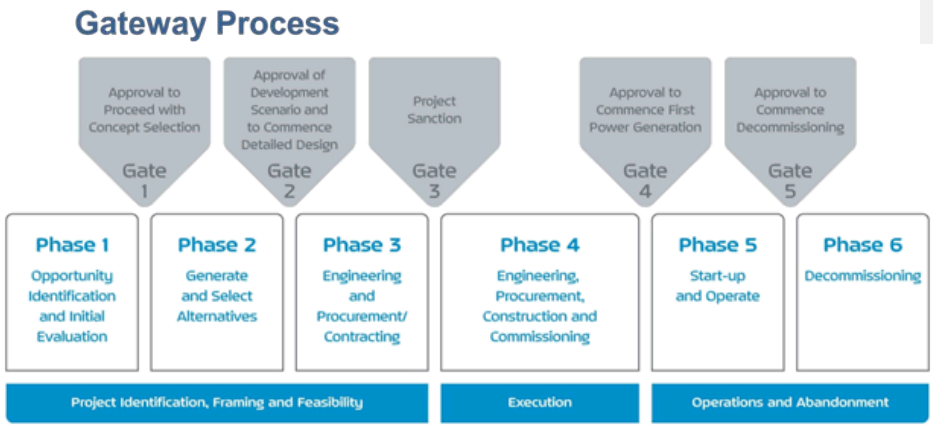

Figure 4-5: Gateway Process

4.3.3 Allocation of Responsibility

Appendix A presents a breakdown of project responsibilities between Nalcor and SNC-Lavalin and is indicative of the agreement. Where there is conflict between this table and the Agreement, the Agreement shall govern.

4.3.4 Project Phasing and Hand Off

Figure 4-5 depicts the Gateway Process that Nalcor has been following for the execution of the Lower Churchill Project. The project layout and the basis of design are generally as established by Nalcor at the end of Phase 2 of the Gateway Process.

The EPCM services began during the Feasibility Phase (Phase 3) of the Gateway process and will continue through the Detailed Design and Construction Phase (Phase 4) and into Operations (Phase 5), if required.

The EPCM work will be carried out in three stages. Stage 1 involves the mobilization of services and began on February 1, 2011. This was the effective start date of the EPCM Agreement. Stage 2 will begin upon completion of Stage 1 and end upon submittal of the following deliverables:

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- The Gate 3 Key Deliverables;
- An estimate of the Reimbursable Labour Cost Hours for Stage 3; and
- A Milestone Payment Schedule for Stage 3.

The Schedule for completion of the noted deliverables is December 15, 2011. Stage 3 will commence at the end of Stage 2 and will end upon completion of the services. The work will encompass the EPCM services for the construction and operations phases of the project and will be complete up successful handover of the operational facilities.

4.4 PROJECT GOVERNANCE

Policies and Guidelines

Project governance will be provided by Nalcor. SLI, its representatives, its employees and its Sub-contractors, works Contractors and Vendors must comply with all applicable Project Environment, Health & Safety policy requirements and with all guidelines, procedures, and regulations governing the Project and the Project sites. The Nalcor Environment, Health & Safety corporate policy as provided in Appendix B will be applied during the execution phase of the Project.

4.4.1 Project Guidance

Guidance for the Lower Churchill Project will be provided by:

- ~~the~~ The Nalcor Project Management Team
- ~~the~~ The SLI Project Sponsors
- ~~the~~ The SLI Project Management Team

4.4.2 Execution Approval Authorities

The following table of authorities shows the approval levels of the various stakeholders:

Project Teams (SLI and Nalcor) will establish the project objectives for Environment, Health & Safety, Quality and Schedule and will provide:

- ~~approvals~~ Approvals in terms of all acts performed by SLI for and on behalf of the Client;
- ~~interface~~ Interface coordination between the project and operations both at handover and throughout the project;
- P~~p~~roject management decisions, covering the day-to-day running of the project; and
- ~~change~~ Change management and control.

4.4.3 Project Reviews

Regular project reviews will be held in order to ensure adherence to Nalcor's corporate requirements. The regular project reviews will be supplemented with special reviews should conditions so warrant.

- The Client Steering Committee/Sponsors will conduct reviews at discrete project milestones, e.g. at the stage gate.
- The Project Teams will undertake monthly reviews of project performance with additional reviews at significant project milestones, or events.

- The SLI Steering Committee/Sponsors will undertake reviews at discrete major project milestones.
- SLI will conduct periodic Peer Reviews at discrete major milestones and at the Client's request.

4.4.4 Meetings

Internal communication of progress will take place through a series of management meetings to be held at fixed intervals. The key management meetings are recorded in the following table:

Table 4-1: Key Management Meetings

Meeting	Frequency
Project Review	At discrete milestone
Project Review SLI Steering Committee/Sponsors	At discrete milestone
Project Management Progress Meetings	Weekly
Procurement & Engineering (CPN) Milestone Progress	Weekly
Pre-operational Verification (COMPLETIONS)	Monthly
Milestone Progress	Monthly
Contract Progress	Monthly
Project Cost Trend and Forecast	Monthly
Risk Trend	Monthly
Change Management	Bi-Weekly

New table; Nalcor / Sli Integrated Project Management meeting program " Improving organization effectiveness" Rev. 0 29 Jan 2012

The management meetings will be supplemented with Area and Discipline review meetings.

4.4.5 Project Key Performance Indicators

The overall KPIs for SLI for the Lower Churchill Project are as follows:

To Be Developed

5 ~~PROJECT ORGANIZATION~~PROJECT ORGANIZATIO

5.1 PROJECT MANAGEMENT AND ORGANIZATION

The relationships between the major entities involved in the management and execution of the Project is shown below.

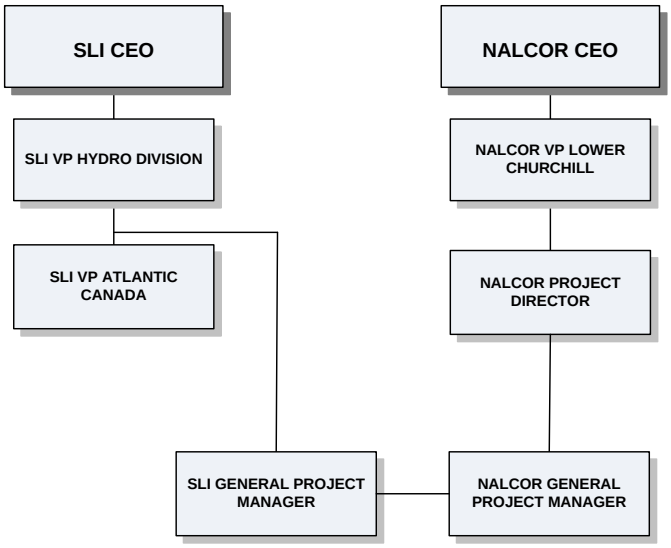


Figure 5-1: Physical Project Structure for Reporting Relationships

The key entities in the management of the project are:

- Nalcor Organization;
- Nalcor CEO, providing approval of the overall project budget, schedule and execution strategy as well as the approval of changes which are outside the sanctioned scope of the project;
- The Nalcor VP Lower Churchill Project, is responsible the Project;
- The Nalcor Project Director, reporting to the VP for the Lower Churchill Project is accountable for project delivery.
- The Nalcor General Project Manager reporting to the Nalcor Project Director is responsible for delivery of C1, C3 and C4;

- The Nalcor Operations Team, reporting to the Project Director for the Lower Churchill Project, will be responsible for the commissioning and operation of the project components;
- SLI is the EPCM Contractor responsible for the day-to-day management, planning, reporting and controlling of budgets and schedules, the detailed engineering, procurement of goods and services and management of construction in accordance with the Project policies, procedures and guidelines;
- Vendors, Sub-contractors, and third parties supplying goods and services to the Project;
- Purchase orders and subcontracts will be executed by Nalcor;
- External organizations are those organizations with whom the Project interacts in the course of the execution of the Project, which includes other consultants.

5.1.1 Project Locations

5.1.1.1 EPCM Team

The Project office will be located in 350 Torbay Road St. John's, Newfoundland and Labrador. Where practical due to cost and schedule all engineering and project functions will occur in Newfoundland and Labrador.

5.2 PROJECT TEAM

5.3 EPCM CONTRACTOR PROJECT TEAM

The SLI EPCM Project organization has been structured on the principal of matrix organization whereby the Project is divided up into the three project components and sub-areas, which have been created for management purposes. Each area is under the management of an Area Manager who reports to SLI Component Project Manager, however, some areas could be merged.

The SLI organization is shown in Figure 5-4 below, the detailed organizational charts are included in 505573-0000-30AE-I-0002.

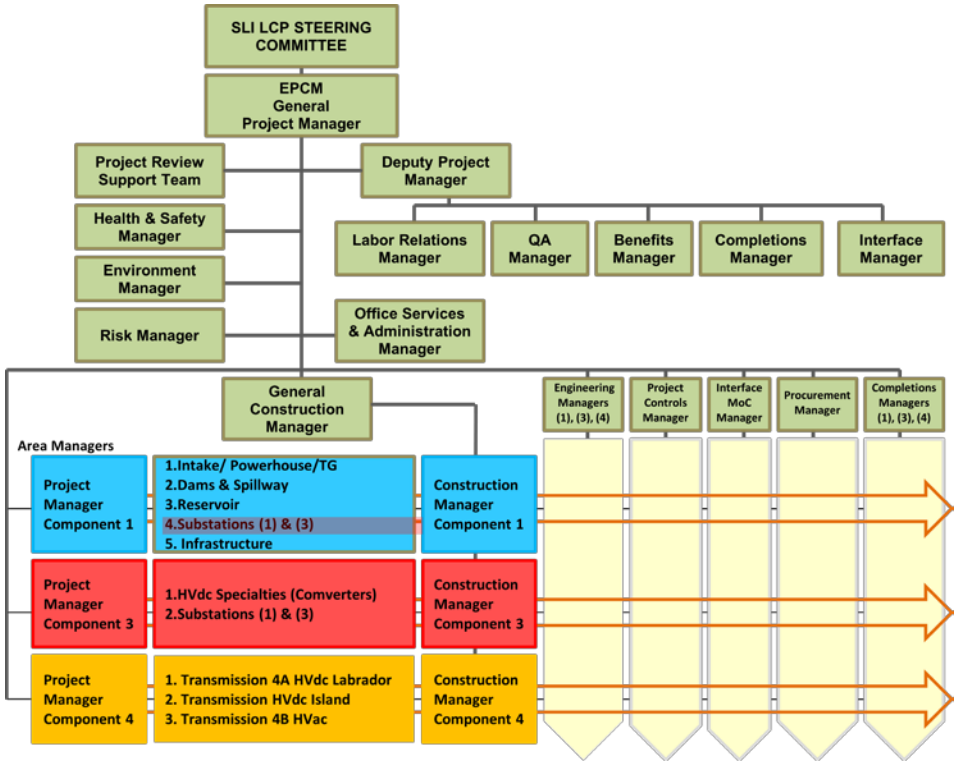


Figure 5-2: SLI Organization

The SLI General Project Manager has overall day-to-day responsibility for the EPCM activities. He is responsible to the SLI Steering Committee for execution of the Project in accordance with the Agreement as well as meeting SLI corporate goals.

The Component Project Managers will report to the General Project Manager and have full responsibility (cost, schedule, and quality) for the delivery of their respective Component. They will work in the matrix organization across disciplines and with the Functional and Area Managers to execute their work.

The Area Managers have full responsibility (cost, schedule and quality) for the delivery of their area of responsibility. They will work in a matrix fashion across disciplines to manage and execute their work.

The Functional Managers will also report to the General Project Manager, and will be responsible for ensuring that the necessary resources are available to meet the requirements of the Component Project Managers and their Area Managers and that the work is undertaken in accordance with the Project codes, standards and procedures. The Functional Managers are responsible for the timely development of documentation in accordance with the Project Schedule.

Members of SLI Project Team report to their respective Functional Managers for quality and to Area Managers for content and approvals.

We should promote integrated project organization which integrated Nalcor team with our team.

5.4 ROLES AND RESPONSIBILITIES

SLI LCP STEERING COMMITTEE

The SLI LCP Steering Committee is comprised of the following:

- VP of the Global Power Division
- VP of the Hydro Group
- VP of Atlantic Canada

SLI General Project Manager

The General Project Manager or delegate is the approver of the Project Management Plans. They are responsible to verify that the plans reflects SLI's management approach and the requirements of the Project Agreement for delivery of the project and to ensure that these Plans are adhered to and applied consistently across the project.

SLI Component Project Managers

Responsible for the management of their component project teams in accordance with the objectives of the Project Execution Plan.

SLI Area Managers

Reporting to the Component Project Managers they are responsible for the management of full scope (scope, cost, and schedule) for their Area in accordance with the objectives of the Project Execution Plan.

SLI Functional Managers

Responsible to develop and implement the functional management plans for their area that are aligned with the coordination procedures the Project Agreement, SLI procedures and the objectives of the Project Execution Plan.

- **Engineering Managers** – Responsible for producing the detailed engineering in accordance with the Project schedule and the required codes, standards and quality control for each component.
- **Procurement Manager** – Responsible for the procurement process from establishment of bidders' lists through evaluation, award administration and closeout of contracts and purchase orders. Approval of contracts and purchase orders and any variation orders will remain the prerogative of the Owner. In addition, the Procurement Manager will be responsible for supplier inspections, expediting and logistics.
- **Project Controls Manager** – Responsible for the detailed planning and scheduling of Project scope of work and for the monitoring and reporting of Project costs and progress.
- **Construction Manager** – Responsible for the implementation of EHS program on site, the establishment of the temporary facilities, the coordination of the work of the Contractors on-site and the administration of contracts.
- **Completions Manager** – Responsible for the Completions and handing over of systems and facilities to the EOT team for commissioning.
- **Environmental Manager** - Responsible for ensuring that the Project is designed and constructed in accordance with all Environmental laws and regulations as well as Nalcor's and SLI's Environmental Policies.
- **Health and Safety Manager** – Responsible for ensuring that the project is designed and constructed in accordance with all Health and Safety rules and regulations as well as Nalcor's and SLI's Health and Safety Policies.
- **Industrial Relations Manager** – Responsible to advise and support Nalcor in the negotiation of the Project Labour Agreements. Responsible for the implementation and administration of the Project Labour Agreements
- **Risk Manager** – Responsible for the implementation of the EPCM Risk Management Plan.
- **Benefits Manager** – Responsible for the implementation of the Project Benefits Agreement and reporting of local benefits for the Project.
- **Quality Manager** – Responsible to develop the Quality Plan for the EPCM Scope of work and for the implementation and maintenance of the overall Project Management System.

SLI Team Members

It is the team rResponsibility to read and understand and adhere to the requirements of the Project Execution Plan.

6 COMMUNICATIONS

Maintaining open lines of communication between the various parties will be one of the major keys to the success of the Project. All formal communications between the between the Nalcor operations and SLI management groups as well as communication with other government and para-government agencies, will be the responsibility of the Nalcor Project Team. Formal communications with Suppliers and Contractors will be managed by the EPCM Consultant on behalf of Nalcor.

The lines of communications are shown below.

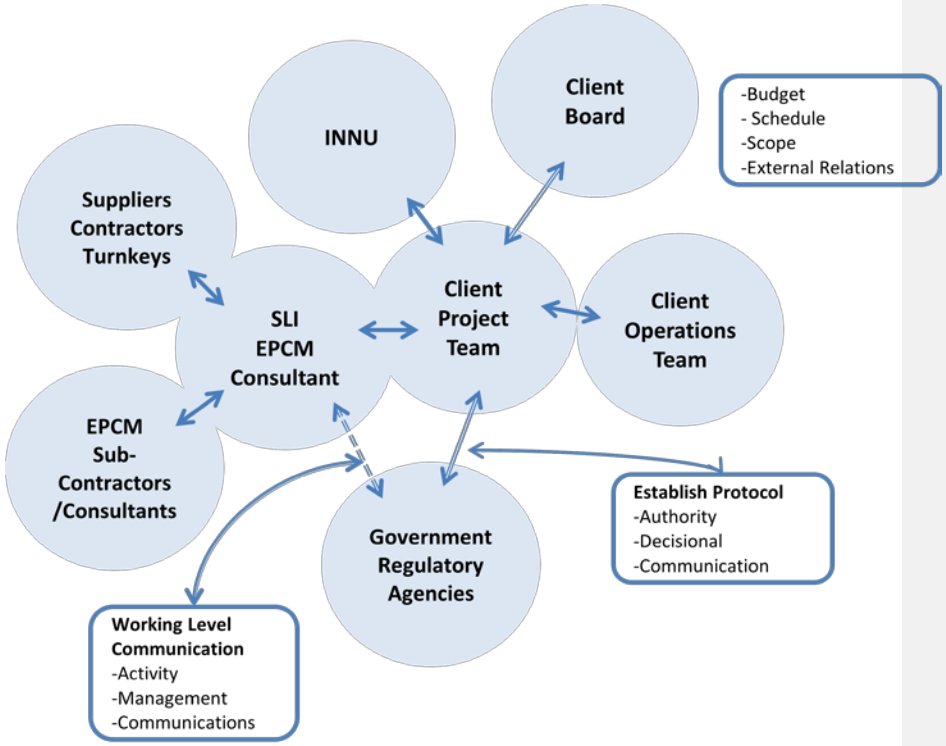


Figure 6-1: Communication Links

Communications to public media should be restricted to client team with clear procedures.

The key interfaces between SLI and Nalcor Project teams will be at the Project Manager, Component Manager, Area Manager and Functional Manager levels.

6.1 FUNCTIONAL TEAM LOCATIONS

The Project will require the work to be managed from the main Project Office as well as the various component construction site offices.

6.1.1 Project Office

The Project office will be located in the project management office (PMO) building at 350 Torbay Road St. John's and will be the primary location for the following functions:

- Project Management
- Project Controls and Information Management Systems
- Procurement and purchase order administration
- Engineering and Document Control
- Environmental Management
- Health and Safety Management
- Administration
- Quality assurance
- Risk management
- Local Benefits Management
- Industrial Relations Management

6.1.2 Construction Sites

Construction related operations will be centered in the construction office at;

- Component 1
  - Muskrat Falls Construction Site
- Component 3
  - Churchill Falls
  - Muskrat Falls
  - Forteau Point
  - Shoal Cove
  - Soldiers Pond
  - L'Anse au Diable

- Dowden's Point

- Component 4
  - Muskrat Falls
  - Deer Lake
  - Remote Camps

The primary functions undertaken from the construction site offices will include:

- Construction management
- Health, safety, environmental and quality management
- Site management, including security
- Contract administration
- Field procurement and materials management
- Field planning and progress monitoring
- Industrial relations
- Field engineering and quality control
- Completions and Commissioning

6.1.3 SLI Project Office

A small presence will be maintained in St. John's, Hydro Montreal and T&D Calgary Home Offices to provide corporate support in the form of regular visits to site by the executive, Peer Reviews, quality assurance audits and the like.

6.1.4 IT Infrastructure

The main project offices will be connected to each other through a Virtual Private Network (VPN) as shown schematically in figure 6-2 below. Details of the IT architecture and software are given in Section 11.

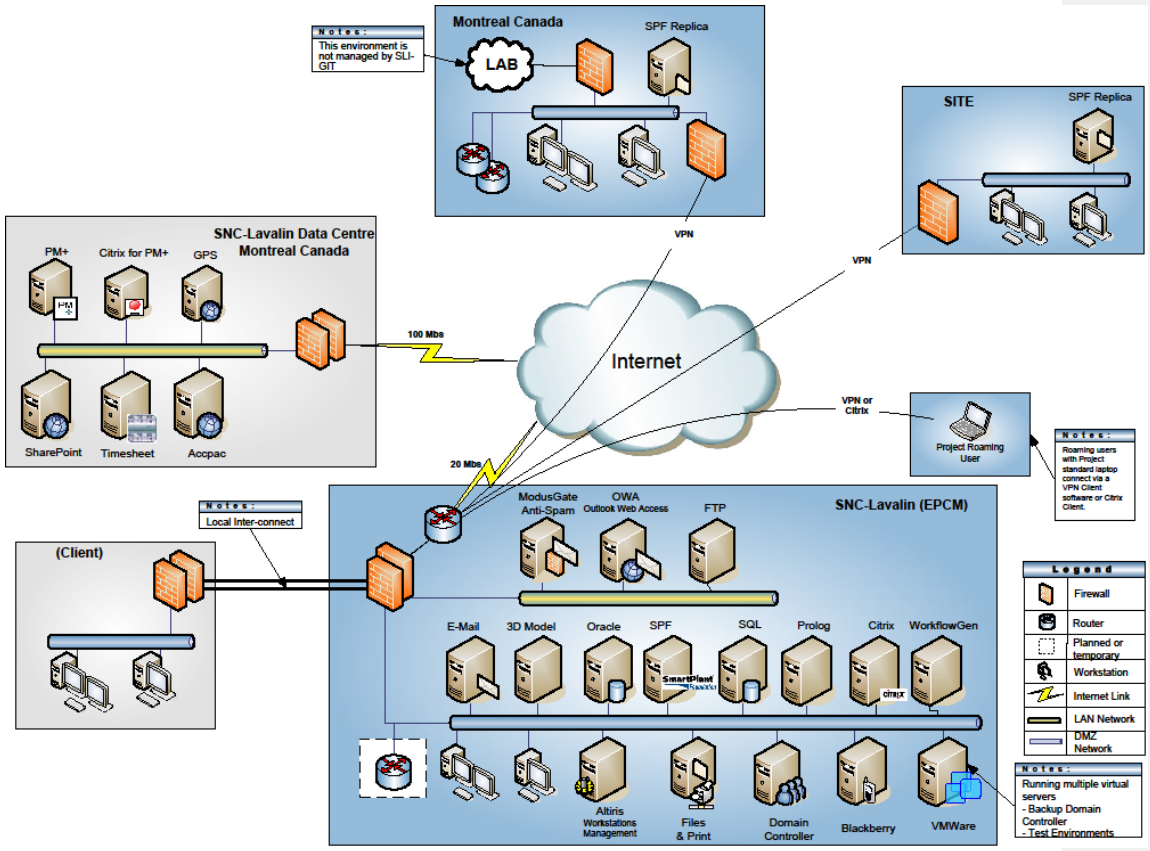


Figure 6-2: Lower Churchill Project – IT Infrastructure Schematic

7 PROJECT H&S EXECUTION PLAN

7.1 HEALTH AND SAFETY MANAGEMENT OVERVIEW

Committed to the well-being and continuous improvement of our people and the communities in which we live and work. They are the key to our success.

These H&S pillars are achieved through respect, integrity, transparency, empowerment, teamwork and accountability. Dynamic leadership and risk-based management processes and behaviors support these core values.

The H&S Management Framework, presented in Figure 7-1, outlines the approach and various processes that SLI deploys, throughout its business cycles and on all of its projects; to identify, reduce and eliminate the consequences of unacceptable risk throughout the Company's operations.

These include; setting the vision, developing behavioral based strategies, leadership structures, risk based and schedule driven implementation, trending and auditing plans and procedures; thus establishing a measurement framework that is continuously improved, to the required level, throughout each of SLI business and project phases.

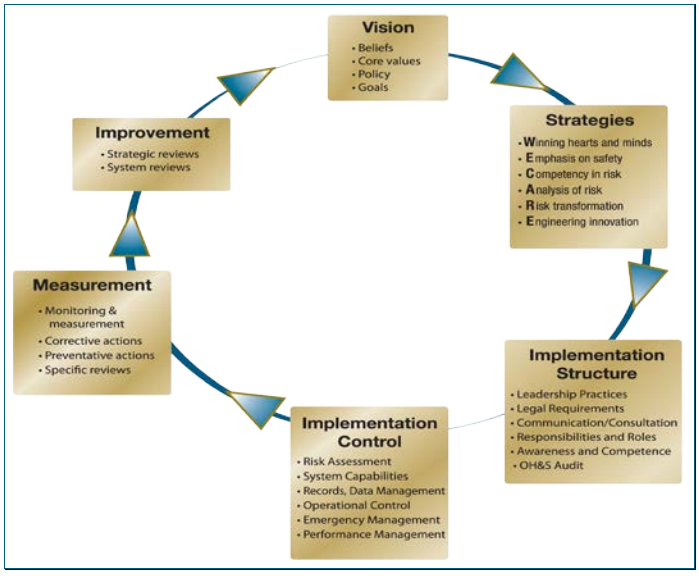


Figure 7-1: Health & Safety Management Framework

Detailed project H&S Requirements are outlined in the Project Health and Safety Management Plan 505573-0000-68RA-1-0001-00

The Project H&S Plan includes the following:

- Corporate Commitments
- H&S Policy
- SLI We Care policy
- Management Commitment and Leadership
- H&S Scope
- H&S Organizational Structure
- H&S Roles and Responsibilities
- H&S Standards
- Contractor Management
- Risk Management
- Training
- H&S Communication
- Incident management and Reporting
- Emergency Response
- Drugs and Alcohol
- Security
- Change Management

7.2 H&S ORGANIZATIONAL STRUCTURE

The critical element of SLI's H&S Management System, is leadership. Leadership is what drives and sustains the system. It is the essential spark to promote visibility, momentum, a sense of organizational commitment and direction and ultimately, reinforcement. It is a key to the success of the Project.

Coupled with the above, SLI fully understands not only the scope of the Project, but also the site specificities and Lessons Learned that can only be acquired through hands on experience on similar projects.

Based on the leadership and experience requirements outlined above, SLI proposes the H&S organizational structure as shown in Appendix C (Chart 1 and Chart 10) in order to execute the project safely and in a sustainable manner.

7.2.1 SLI General Project Manager

The General Project Manager will have the overall responsibility for the health, safety and well being of all Project personnel including site visitors. Additionally, he/she shall be responsible to continually ensure that SLI complies with the local rules and regulations as well as the project lenders' environmental and social guidelines in order to minimize the Project's environmental footprint. The Project Manager will delegate his duties as reasonably appropriate and appoint (among others) the Site Construction Manager, Area Construction Managers, H&S Manager and Area Managers as the responsible persons for ensuring that H&S is effectively implemented and managed in the different areas.

7.2.2 SLI H &S Manager

The SLI H&S Manager will have overall responsibility for the H&S Team and will report directly to the Project Manager. The H&S Manager will be responsible to ensure that:

- H&S policies, standards and procedures are established;
- H&S compliance to procedures and legislation is monitored;
- H&S deficiencies are brought to the relevant line management and/or Contractors attention;
- H&S inspections and audits are conducted;
- incidents are reported, investigated, recorded and actions are taken to prevent reoccurrence;
- the project staff is supported insofar H&S advice and guidance is concerned as well as to ensure that H&S is lead and managed in an inclusive and effective manner;
- the H&S Team will be staffed by highly qualified and experienced professionals that are proactive in identifying large scale Hydro, HVdc and Transmission Project Risks, issues and/or concerns prior to their occurrence. SLI will allocate H&S team leaders in defined areas in which they will be accountable to achieve best in class, behavioral based project goals and objectives, including eliminating and reducing risks and behaviors as low as reasonably practicable;

7.3 SUB-CONTRACTOR H&S PLAN

All potential Sub-contractors, as part of their bid, will be required to submit an H&S Plan specific to their scope of work and an H&S corporate Plan that is in conformance with the SLI H&S Management Plan. The successful bidders' H&S Plans will be assessed and, as required, upgraded so as to be fully aligned with SLI's approved H&S Plan. If a bidder is subsequently retained, the contract documentation will include the approved H&S Sub-contractor Plan, the contents of which will be contractually binding.

SLI puts substantial effort to managing its Sub-contractors so as to ensure they are competent in terms of carrying out their work safely and in an environmentally sustainable manner, while meeting project quality requirements. The SLI H&S Management Plan will require Sub-contractors to meet every obligation required of SLI on its site via "back to back agreements" which will mirror SLI obligations to Nalcor.

All Sub-contractors will have a ratio of one (1) Safety Advisor to fifty (50) employees on the Project or as per discretion of the SLI H&S Manager or his delegate upon a full review of pertinent risks.

It is an H&S requirement that the Contractor site project team attend the kick-off meeting to ensure information shared is communicated to the responsible employee.

7.4 EMERGENCY PREPAREDNESS AND RESPONSE (EPR)

7.4.1 General

On-site emergency drills and simulations will be conducted in a systematic manner so as to ensure that should an emergency occur, timely response is initiated.

Furthermore such drills, as experienced on similar projects has shown, and as proven throughout SNC-Lavalin projects globally, reduces the likelihood of incidents arising from careless behavior as project personnel become more sensitized to the potential consequences to their actions.

SLI's H&S Manager will ensure that the Emergency Preparedness and Response Plan (EPR) will be compatible with Nalcor's own Operational Emergency Response Plan.

Due to the changing nature of project hazards, changes will be made to the Emergency Response and Preparedness Plan as required. It will be the responsibility of the H&S Manager to ensure that the Emergency Response and Preparedness Plan correspond to requirements and Nalcor's operational context.

7.4.2 Fire Prevention

SLI will have a team for fire prevention activities and be ready to intervene if a fire occurs. Specific fire prevention procedures will be elaborated to govern fire risk activities. Fire prevention/extinction methods will be addressed in the H&S induction. Extinguishers will be located in:

- offices;
- camps;
- eating areas;
- all vehicles circulating on site; and
- any other place where there are significant fire ignition sources.

7.4.3 Medical Services

Project management will contract out through Nalcor, for 24/7 emergency medical services at the Muskrat Falls site. These services will comply with local and international standards and regulations in the matter. The emergency medical services will include setting up a medical team on the site. This medical team will be set up in accordance with site requirements and shall ensure that:

- a competent medical/first aid staff is able to respond rapidly and effectively in all situations;
- the necessary emergency medical treatment is given to stabilize the condition of project personnel in the event of an injury or ill Health;
- a medical clinic is established, staffed and equipped to provide appropriate care; and
- Project shall be provided with a transport vehicle for the transport of injured workers.

7.4.4 First Aid Responders

SLI will ensure that all Contractors appoint and provide a trained person to give first aid care on site at all times that the Contractor is carrying out work on site. The minimum qualification shall be at least a Level 2 Certificate (able to perform

Cardiopulmonary Resuscitation with the help of AED if available, and first aid techniques).

Ratio of First Aid Responders to workers will be dependent on the risk assessment on Contractors work that is being done on each specific location.

If the workers are separated into groups then each group will be required to have first aid coverage and will be assessed separately as above.

7.5 H&S AUDITS

H&S audits will be carried out, and reported to management, on a regular basis by both SLI and the site Contractors, in accordance with the Project audit schedules. Their focus will be strategic, risk based, flexible and will welcome Project personnel input.

These audits will be an essential “Lagging Indicator” of SLI’s H&S system – as continuous improvement will be linked to the success of these audits.

In addition to the regular audits, special audits will be undertaken on an “as needed” basis to:

- determine if H&S plans have been implemented and if targets and objectives have been achieved;
- confirm that risk controls have been implemented and that they are effective;
- learn from system failures through incident investigations;
- provide information that can be used to review and improve the system;
- record and rate the overall performance of Contractors; and
- review corporate audits that must be conducted by corporate management.

Poor environmental, health and safety performance by a Contractor will result in a contract notice being issued to the Contractor. Following the issue of the notice, the Contractor will be required to develop and present an intervention plan. The Contractor will have to implement this plan, in an agreed timeframe, incorporating any comments from SLI. Closeout actions to record corrective measures will be documented.

7.6 SITE SECURITY

Forming the backbone of Site Security will be; a security policy, processes, procedures and instructions; incident reporting and analysis; training and security awareness (in conjunction with other members of the H&S team); periodic assessments, inspections and auditing so as to strive to attain excellence.

SLI proposes, for Nalcor approval, based on its experience, that:

- SLI will provide overall construction site security through a dedicated security service provider who will be responsible for both access control and perimeter security of the construction site. The security service provider would be supervised by the SLI Site Construction Manager.
- Construction has its own access and egress points (staff, Contractor and delivery entrance/exit points). Access would be through a gate manned 24/7. ID badges will identify a holder's permission to enter the area. XX types of badges will be issued:
  - Nalcor Staff
  - EPCM Staff
  - Construction
  - Tie-in/Commissioning (colour coded)

Access control strategy will be enhanced using a custom-tailored electronic access control system deployed on similar past projects.

7.6.1 Construction Site Access Control

All personnel entering the construction site will be required to attend the site induction course provided by SLI prior to being admitted to the site and followed by the Contractors' internal induction process. Management and supervision will, in addition to the above, be required to attend specific management and supervisory training prior to being badged and admitted onto site.

All project personnel will be required to wear an ID badge at all times.

Security restrictions will be imposed on all personnel entering the site areas and entry will be subject to identity checks and random searches. All vehicles will require site passes.

Vehicular access to site will be limited on a strict need to basis. No motorcars or exclusively private vehicles will be allowed onto the site – these will be parked in the external car park at the main gate. Dedicated color coded roads will be established for the various sectors. Only vehicles with the appropriate colored site pass will be allowed.

Visitors will be recorded and inducted by means of an audio-visual presentation and then badged at the main gate reception area. Visitors will be escorted onto site by responsible personnel who have undergone the full induction process.

Contractors will be responsible for the security of their laydown and work areas as approved by SLI.

8 PROJECT ENVIRONMENTAL PLAN

8.1 ENVIRONMENT MANAGEMENT OVERVIEW

The Environmental Management Model, presented in Figure 9-1 outlines the approach that SLI has deployed for the Lower Churchill Project. This approach is adapted from Nalcor's Environmental Management System.

The approaches and processes include development of and Environmental Policy, Planning, Implementation and Operation, Checking and Corrective Action, Management Review and Continual Improvement, thus establishing a measurement framework that is continuously improved, to the required level, throughout each of SLI business and project phases.

During the execution of the study phase, these values have been carefully aligned with those of Nalcor and have resulted in the development of a Project Wide Environmental Protection Plan. This Plan will be used by all Project participants and will be a basis for contractors to develop their own Contract-Specific Environmental Protection Plans.

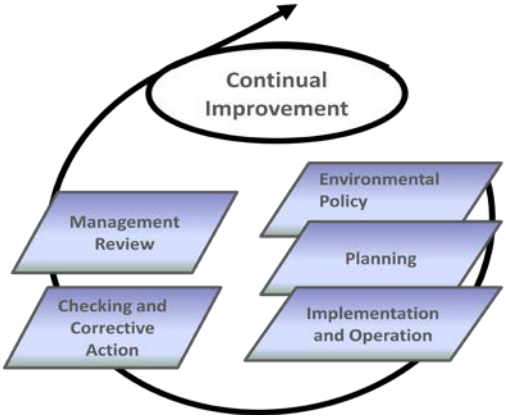


Figure 8-1: Environmental Management Model

8.2 CORPORATE COMMITMENTS

As outlined in SLI's Environmental Management Overview above, SLI is fully committed, both at the Project sites and in the surrounding communities, to ensuring that the project continues to be the industry model for Environmental implementation. This specifically includes placing the highest priority on the environmental performance of the project and its stakeholders, including personnel, Contractors and Subcontractors as well as minimizing the environmental footprint of the project. SLI's corporate We Care Statement and Environmental Policy outline corporate commitments.

8.2.1 Nalcor Environmental Policy

A copy of Nalcor's Environmental Policy, is attached in Appendix A. SLI is fully committed to continuing compliance with this policy, and any improvements that might be included therein for the execution of the project. Furthermore, SLI will continuously adapt its behavioral based strategies, approaches and processes to maintain the Environmental program position with industry leading Environmental programs and performance.

The SLI Project organization structure will endorse, support and promote the systematic implementation of Nalcor's Policy and Mission Statement by all stakeholders of the Project. This will include SLI site-specific and offsite Contractors and generally in all areas where the Project is involved and has authority over Environmental aspects.

8.3 ENVIRONMENTAL OBJECTIVES – LEADING AND LAGGING INDICATORS

SLI sets Environmental objectives for each project and these are systematically reviewed for project specific requirements and risks.

Listed below are the Environmental Project objectives that SLI has developed based upon its project experience and in consideration of other large scale project best practices that SLI is executing, both regionally and globally.

These Key Performance Indicators will be further reviewed and elaborated on prior to their deployment on site.

Environmental Key Performance Indicator (KPI)	Target
Community Complaints	No repeat complaints
Environmental Spill Incidents	No level 2 or 3 incidents
Compliance to local rules and regulations	Zero violations to the laws and regulations
Project lenders' environmental and social guidelines	Zero material non-compliance
Office waste recycle program	SLI offices in St. John's
Construction waste recycling program to local standards	Contractors' sites laydown areas
Management of hazardous waste program	Contractors' sites laydown areas
Water conservation program	SLI and Contractors' office sites
Rehabilitation program	Restoration of construction areas upon work completion in accordance with the Project Rehabilitation Plan

In order to monitor the environmental performance of various Contractors, a number of pro-active and reactive performance measurements will be set and monitored during the execution phase of the Project.

Driving this process, there will be daily toolbox meetings with Contractors and daily field reports completed by the On-Site Environmental Monitor. In addition quarterly Environmental Reviews will be completed by the Environmental Coordinators to review the Contractors' performance.

8.3.1 Leading Indicators

SLI is a strong advocate of promoting the implementation of leading indicators as they are the drivers of Environmental performance.

Leading indicators will allow SLI to proactively identify trends in Environmental performances and to rapidly implement effective action in order to eliminate or reduce a negative trend.

As the project execution evolves, each indicator will then be reviewed for validity, reliability and effectiveness. Subject to review prior to their deployment on site, these measurements will include, but not be limited to:

- Audits
- Contractor Environmental Advisor Training and assessments
- Corrective Actions
- Daily Crew Meetings
- Daily Inspections

- Environmental Inductions
- Environmental Meetings
- Hazardous versus Non-hazardous waste generated
- Recycled Material

8.3.2 Lagging Indicators

Lagging indicators that summarize past events will also be measured, trended and reported on an ongoing basis during the execution of the Project. These will include, but not be limited to:

- Level 1 environmental incidents
- Level 2 environmental incidents
- Level 3 environmental incidents

In conjunction with the Leading Indicators, the Lagging Indicators will help assess Environmental Project trends and performance. Adjustments and continuous improvement and awareness programs will be implemented accordingly.

8.4 SCOPE OF ENVIRONMENTAL MANAGEMENT

A comprehensive Environmental Management Plan will be used to manage the Lower Churchill Project's Environmental aspects on a project-wide basis. This Plan will detail the approach and applicable procedures which will be implemented by all contractors.

8.5 ENVIRONMENTAL ORGANIZATIONAL STRUCTURE

Based on the leadership and experience requirements outlined above, SLI proposes the Environmental organizational structure as shown below in order to execute the project safely and in a sustainable manner. See Appendix C for detailed Organizational Charts.

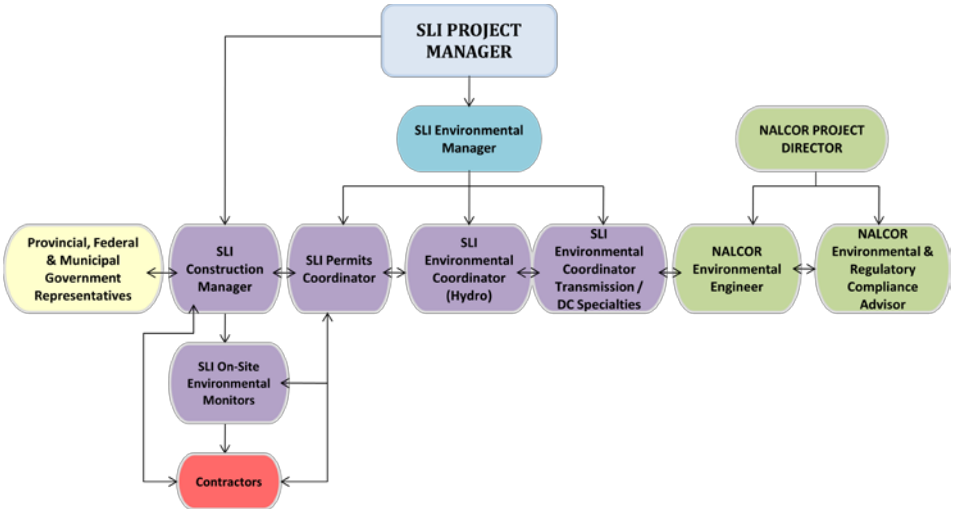


Figure 8-2: Environmental Organizational Structure

8.5.1 SLI General Project Manager

SLI's General Project Manager will be accountable for the Environmental performance and compliance of all Project personnel including site visitors. Additionally, he shall be responsible for continually ensuring that SLI complies with the local rules and regulations as well as the Project lenders' environmental and social guidelines in order to minimize the Project's environmental footprint. The General Project Manager will delegate his duties as reasonably appropriate and appoint (among others) the Site Construction Manager, Environmental Manager and Area Managers as the responsible persons for ensuring that Environmental Management is effectively implemented and managed in the different areas.

8.5.2 SLI Construction Manager

SLI's Construction Managers have responsibility of their respective components to ensure:

- Environmental management within the site construction limits;
- That all personnel on site, be they direct hire, contractors or other, adhere to the Environmental Management Plan (EMP);

- That regular project review meetings address environmental issues;
- That appropriate and prompt action be taken to correct any non-compliance to the EMP; and
- Proper delegation of day-to-day responsibility for onsite environmental management to the On-Site Environmental Monitor.

8.5.3 SLI Environmental Manager

The SLI Environmental Manager will have overall responsibility for the Environmental Team and will report directly to the Project Manager. The Environmental Manager will be responsible for ensuring that:

- environmental policies, standards and procedures are established;
- environmental compliance to procedures and legislation is monitored;
- environmental deficiencies are brought to the relevant line management and/or Contractors attention;
- environmental inspections and audits are conducted;
- incidents are reported, investigated, recorded and actions are taken to prevent reoccurrence;
- the Project staff are supported insofar Environmental advice and guidance is concerned as well as to ensure that Environmental affairs are led and managed in an inclusive and effective manner;
- the Environmental Team is staffed by highly qualified and experienced professionals, and that they are proactive in identifying large scale (Hydro, HVdc and Transmission) Project Risks, issues and/or concerns prior to their occurrence. SLI will allocate Environmental team leaders in defined areas in which they will be accountable to achieve best in class, including eliminating and reducing risks and behaviors as low as reasonably practicable;

8.5.4 SLI Environmental Coordinators (Generation and TL and DC Specialties)

The Environmental Coordinators will report to the Environmental Manager. Their main responsibility will be to ensure that all environmental aspects are properly addressed throughout the implementation of the project. The Environmental Coordinators are specifically required to:

- provide leadership and ongoing liaison with all Project stakeholders to develop, deploy, audit and continuously improve environmental response plans and procedures;
- implement the Environmental Management Plan of the construction phase.

- ensure that Contractors on site develop, implement and monitor their environmental management programs.
- manage scheduled audits and inspections on Contractors' performance on site, with subsequent report back to management and assist the Client during the lender external audit.
- coordinate interaction between SLI's Area Managers, Package Engineers, Construction Managers, On-Site Environmental Monitors, and Nalcor's environmental staff to ensure the Environmental Management Plan and its subordinate plans, including the P-WEPP is effectively implemented within their specific project components.

8.5.5 SLI On-Site Environmental Monitors (OSEM)

Reporting to the Environmental Manager in a functional manner and to the Construction Manager (CM) in line, the OSEM will support the successful implementation of the EMP through the following tasks:

- Review of Contract-Specific Environmental Protection Plan.(C-SEPP)
- Investigate and report on environmental incidents
- Audit the implementation of C-SEPPs.
- Oversee the execution of the activities described in the Environmental Management Plan
- Ongoing liaison with appropriate Project personnel
- Maintenance and management of the monitoring program
- Weekly and monthly reporting
- Participation in the weekly Environmental Coordination Committee meetings
- Providing liaison on environmental issues between SLI and the Contractors

8.6 ENVIRONMENTAL MANAGEMENT DOCUMENTATION

SLI will develop, an Environmental Management Plan to establish Environmental protection expectations; promote Environmental awareness; best in its class Environmental performance; and, standards that are aligned with the leading international standards in the industry.

The Environmental Management Plan will comply with the Environmental Assessment requirements and all provincial and Federal regulations and environmental requirements.

Subordinate documents to the Environmental Management Plan include the following:

- Project-Wide Environmental Protection Plan (P-WEPP)
- Waste Management Plan
- Rehabilitation Plan
- Regulatory Compliance Plan
- Emergency Response Plan

The Environmental Management Plan (and its subordinate documents) will include, but not be limited to the following:

- processes and procedures with regards to environmental lessons learned in previous phases;
- processes and procedures with regards to Project management to ensure that no harm is done to people, Nalcor, installations, facilities, equipment or to the environment;
- measures to minimize adverse environmental effects arising from transport of construction materials;
- measures to minimize the contamination of land due to construction activities and measures to avoid groundwater contamination by preventing spills or by taking remedial actions should a spill occur;
- measures aimed at minimizing fugitive air emissions such as dust, smoke and fumes;
- measures to minimize noise nuisance and vibration generation, including the development of guidelines to carry out potentially noisy construction activities during daylight hours as much as practicable.
- direction on managing construction wastes in accordance with Provincial regulations and by implementing a Recycling Construction Waste Program;
- special initiatives to raise awareness of environmental issues throughout the project;
- measures to protect flora and plan at site;
- additional special initiatives, as necessary, as generally discussed with Nalcor.

8.6.1 Environmental Procedures

In light of SLI's successful Environmental performance to date on other large scale projects in the region and abroad, as well as per the Lessons Learned drawn therein,

SLI has developed detailed Environmental critical protocols and procedures for the implementation of the Environmental Management Plan and its subordinate documents. An indicative list of these procedures and protocols is outlined below.

- Environmental Protection Plan
- Permitting
- Contaminated Soil Management
- Cultural and Archaeological Heritage
- Documentation and Record Keeping, Environmental Inspections, Environmental Reporting, Environmental Statistics
- Dust Management
- Environmental Communication Consultation and Awareness Programs
- Environmental Contractor Management
- Environmental Guidelines and Principles
- Environmental Management System
- Environmental Management System Audits
- Environmental Follow-up
- Environmental Management
- Environmental Issues related to Vehicles and Equipment
- Hazardous Materials Management
- Incident Recording, Investigation and Reporting
- Noise Control
- Project Environmental Definitions
- Rehabilitation of Construction Sites and Laydown Areas
- Site Environmental Inspection by External Entities
- Terrestrial Fauna and Flora Protection
- Waste Management
- Water Management

8.7 SUB-CONTRACTOR'S CONTRACT-SPECIFIC ENVIRONMENTAL PROTECTION PLAN

All sub-contractors that have been awarded contracts will be required to submit a Contract-Specific Environmental Protection Plan (C-SEPP) specific to their scope of work that is in conformance with the SLI Project-Wide Environmental Protection Plan.

The successful bidders' Contract-Specific Environmental Protection Plans will be assessed and revised, as required. Once accepted by SLI and Nalcor, the contents of this C-SEPP will be contractually binding.

SLI puts substantial effort in managing its Sub-contractors to ensure they are competent in terms of carrying out their work safely and in an environmentally sustainable manner, while meeting project quality requirements. The SLI Environmental Management Plan will require Sub-contractors to meet every obligation required of SLI on its site via "back to back agreements" which will mirror SLI obligations to Nalcor.

8.7.1 Environmental Reviews– Design, Procurement and Construction Phases

The Environmental review of the design and procurement process will form the corner stone of the Environmental Management system.

Environmental reviews will be conducted as part of the design, procurement, testing, commissioning and construction review processes on all systems.

8.8 ENVIRONMENTAL REPORTING AND STATISTICS

Building on the open and transparent Environmental Reporting procedure established, SLI will report to Nalcor on an array of Environmental Leading and Lagging Indicators (see Section 8-3 of this document), including the analysis and trending of these indicators; the challenges and opportunities faced and lying ahead and, as required, adjustments and focus areas for the upcoming weeks. Awareness raising and training programs, etc., will result from these analyses.

The Environmental Manager, or his appointed delegate, will investigate and maintain a record (Compliance Tracking Registry) of all Environmental incidents that may occur on the Project. Site incidents will be analyzed, recorded and forwarded to Nalcor on a monthly reporting basis to provide a consolidated report that fully meets Nalcor, Lenders and SLI Corporate requirements, and, those of the regulatory authorities. SLI will comply with Nalcor's Incident Reporting Governance Procedure for any incident that occurs.

SLI's Environmental team will put in place emergency response systems and procedures so that critical incidents requiring immediate action will be responded effectively, and, a preliminary report of the event outlined no later than 24 hours after

its occurrence. Verbal notification will be issued per the approved Emergency Response Procedure.

Contractors will be required to report Environmental performance indicators on an "as needed" basis. Incident analysis and statistical data will be distributed and discussed at the safety meetings.

8.9 ENVIRONMENTAL AUDITS

Environmental audits will be carried out, and reported to management, on a regular basis by both SLI and the site Contractors, in accordance with the Project audit schedules. Their focus will be strategic, risk based, flexible and will welcome Project personnel input.

These audits will be an essential "Lagging Indicator" of SLI's Environmental Management Plan – as continuous improvement will be linked to the success of these audits.

Poor environmental performance by a Contractor will result in a contract notice being issued to the Contractor. Following the issue of the notice, the Contractor will be required to develop and present an intervention plan. The Contractor will have to implement this plan, in an agreed timeframe, incorporating any comments from SLI. Closeout actions to record corrective measures will be documented.

9 QUALITY MANAGEMENT PLAN

9.1 INTRODUCTION

SLI Quality Management System (QMS) has been established and will be implemented, maintained and continuously improved in accordance with the requirements of the International Standard ISO 9001:2008.

The QMS used for the Project is based on similar projects but in total accordance with the Lessons Learned. It will be also considered the efficiency of the QMS documentation as the project procedures and the work instructions.

A simplified but powerful quality system will be adopted to support and standardize all the steps of the project. The QMS has been designed to address Nalcor's specific needs.

9.2 ORGANIZATION

The General Project Manager will have the responsibility, through the Quality Manager, to ensure that an effective quality management system will be prepared, approved, and implemented in order to assure that the overall quality requirements of the project will be met. Based on this, SLI proposes the Quality Organizational structure as shown Chart 2B of the Project Organization Charts 505573-0000-30AE-I-0002.

All the aspects of the quality will be under the responsibility of the Quality department:

- Quality Assurance for the management system, including coordination of the "Project Procedures" which will be produced on the targeted schedule for their production and approval by Nalcor.
- Quality Surveillance for the entire material and equipment conformance including Factory Acceptance Tests (FAT).
- Quality Control for the construction and installation deliverables

In total concordance with all the other departments, the Quality Manager (QM) will coordinate all quality-related activities to ensure compliance with the requirements of ISO 9001:2008 and any Client requirements.

The key Quality Management functions will be to:

- Implement SLI project procedures for improvement and any applicable Nalcor requirements rationalization and implementation.

- Supervise the application of the project procedures.
- Establish the quality requirements of Purchase Orders and Contracts.
- Plan an efficient shop surveillance and factory acceptance program.
- Work hand-in-hand with the construction group relative to the implementation of the Contractors' quality programs.
- Build a strong site inspection team to perform the quality control supervision during all the construction phase.
- Ensure control of QC documentation resulting from the day-to-day QC surveillance.
- Consolidation, review and validation of final documentation related to the mechanical acceptance and contract closeout activities and issue the inspection release for completion of work.
- Ensure control of third party testing and coordinate the soils, concrete and NDT laboratories as well as dimensional control surveys.
- Conduct internal and Supplier/Contractor audits and reviews of the QMS including management of the disposition of any non-conformity as corrective action.
- Participate in third party audits conducted by Nalcor and SLI.
- The Quality Manager is responsible for the implementation of the project Quality Plan and for the management and execution of Quality Assurance and Quality Control activities, for reporting and maintaining the QA and QC records for the project.

To support the Project Quality Manager in the implementation of the Project QMS, and to effectively control conformity through the process of Engineering, Fabrication, Construction and Completions, the following main QA/QC functions will be deployed and reporting directly to him:

- Third Party Inspectors to ensure conformity during fabrication at Suppliers facilities.
- Area QA/QC Supervisors and their respective QC discipline inspectors deployed within the Construction Areas to ensure conformity during Construction.
- QC Advisors to ensure control of third party testing and to ensure technical support and interface with Engineering and Field Engineering.
- QA Coordinator to support the QA monitoring and auditing activities in the project.

9.3 QUALITY PLANNING

An Project Quality Plan has been developed (505573-0000-38RA-I-0001) to include all project quality requirements, procedures and steps to manage and control all processes. The Quality Plan identifies the key factors which contribute to the quality of products and performance of services and encompasses all phases of project management, project controls, engineering, procurement, construction and commissioning. All activities within each of these phases are identified within this Quality Plan.

During the early stage of the Project (within the first quarter), all project procedures already developed in previous phases of the project will be re-visited and improved, taking into account the Lessons Learned on this project and the specific requirements of the new contract.

Moreover, general and specific induction sessions will be organized for all the employees in order to facilitate the implementation of the project practices and really broadcast the “Project Way”. During these exercises, the upper Management of the project, in conjunction with Nalcor, will highlight the independence of the Quality group on the project and the non-compromise to Conformity.

9.4 QUALITY ASSURANCE MANAGEMENT

QA Monitoring activities will contribute to demonstrate that the Quality Management System (QMS) is properly implemented on the Project by all Project personnel.

The QA monitoring activities are divided into two categories:

- Process oriented activities (focus on processes/procedures application)
- Production oriented activities (focus on Project deliverables production)

9.4.1 Process oriented QA activities

In order to define and plan the monitoring content and work load, a Project QA Monitoring Plan will be developed and deployed during the course of the Project, on a basis of the Project QMS documentation.

The Project QA Monitoring Plan will be issued for use, on a sampling basis, on the Project to proactively and jointly intervene with those responsible for the implementation of Project QMS documentation in the various departments:

- Project Management

- Engineering
- Procurement
- Administration
- Project Controls
- Construction Management
- Site Contract Administration
- Site Material Control
- Site Planning and Cost Control
- Site Document Control
- Site Quality Control
- Site Engineering
- All the Contractors
- All Suppliers

In order to ensure effectiveness and efficiency during monitoring interventions and actions, the Project QA monitoring focuses on the critical work packages and on the related critical activities included in each Project business process.

The site part of the Project QA Monitoring Plan refers to the processes/procedures included into the Suppliers/Contractors' QA Plans.

The level of criticality related to QA aspects shall mainly be considered during the monitoring. Three levels of criticality are established for the Quality Assurance aspects: Level A = High Critically; Level B = Significant Criticality; Level C = Moderate Criticality; Level D = Minor Critically and Level E = Negligible.

Monitoring planning shall focus on critical activities and tasks related to each Project business process. Criticality is assessed on a basis of risk impact if the concerned activities or task fails.

9.4.2 Production oriented QA Task

The Production oriented QA tasks include:

- Review of Engineering Scope of Work (EW) specifications and other technical specifications released for interdisciplinary coordination
- Evaluation of Request for Quotation (RFP) in regard to QA/QC content
- Review of Bidder pre-qualification documents
- Review of QA Supplier documents for Purchase Orders
- Review of QA/QC documents for Contracts

The data resulting from the Production oriented QA tasks are reported on a Work Package basis either through:

- memoranda, minutes of meeting or other formal communication mediums;
- appropriate signed forms;
- interdisciplinary coordination annotation of technical documents;
- QA surveillance or QA audit reports upon Suppliers or Contractors;
- review of Bidder pre-qualification documents;
- Bidder, qualification (Bidder analysis); and
- review of Supplier or Contractor quality documents.

9.4.3 Reporting

The overall monitoring findings of the Project shall be summarized to propose suggestions to improve identified improvement areas.

The Project QA Monitoring Report is distributed to the persons responsible for implementing the action. Major issues, upon analysis of the data generated by the QA monitoring tasks, are abstracted for inclusion in the Project Quality Periodic Report.

The QA Monitoring Report is also used as input information to initiate a Corrective Action Request (CAR), Preventive Action Request (PAR) and/or Improvement Action. The results of QA monitoring activities are a reliable source to the Project Improvement Plan.

9.5 QUALITY CONTROL FOR FABRICATION

The Supplier Quality program is designed to take into account SLI's extensive experience surrounding the design, manufacture and application of similar Plant equipment, not only in specific product lines, but also within the Supplier community that normally provides this type of equipment including the experience gained on previous phases of the project.

The program depends on close interface with Engineering and Procurement which result in case-by-case analysis of perspective Supplier, their proposed subcontracted services, as well as technical issues from other projects. This close analysis enables SLI to plan and execute prime inspection opportunities at the point of manufacture, and provides flexible hands-on involvement as the equipment proceeds through the manufacturing cycle, including during the Factory Acceptance Tests.

9.5.1 Shop Inspection Project Plan

At the early stage of the Project, the Quality Manager will work with the Project Teams, develops a list of Equipment to be subject to Shop Inspections, including the type of inspections to be performed (In-Process, Test Surveillance and/or FAT).

9.5.2 Development/Review of Specifications

As the Technical Specifications for the Equipment are developed and circulated for review, the Quality Manager shall ensure that the correct Quality Requirements Specification is referenced and that there are no redundancies or conflicts between the Technical and Quality Requirements Specifications. At this time the Quality Manager will mark up the Supplier Data Requirements List (SDRL) related to the type and quantity of quality related documents required for review and/or approval, such as the Supplier's Inspection and Test Plan (ITP).

9.5.3 Evaluation of Suppliers

Prior to award, at the time when the Suppliers are "short listed" for further evaluation, the Quality Manager will review the perspective Supplier's in-house quality program to assure that their controls are adequate for the anticipated scope of work being proposed.

Any questions or concerns that arise from this review are directed back to the Supplier for resolution. If deemed necessary, a pre-award Shop Survey/Audit may be scheduled prior to award. This review is conducted concurrent with the Technical review by Engineering. During these reviews, the QA/QC representative consults with Engineering and utilizing past history with this particular Supplier that may affect the technical decisions and/or dictate additional surveillance or corrective actions by the Supplier.

After award, the Project Quality Manager begins through his QA Coordinator the specific planning phase of the Supplier Quality Process. During this phase, detail manufacturing plans are reviewed, such as how much of the equipment will be subcontracted by the Supplier, where these Sub-contractors are located, what experience have we had with these shops and what type, if any, problems we have experienced in the past.

9.5.4 Supplier Inspection and Test Plans Review

Once the Quality Manager has received the Supplier's ITP (through the Expediting and the Document Control departments) and reviewed it for acceptability in conjunction with the Package Engineer, the initial process of determining best points of inspection is examined and the initial preparation of the Shop Inspection Checklist is developed.

9.5.5 Alignment Meetings

Working with the Project Team, the Quality Manager will participate in the determination of which equipment will require pre-manufacturing alignment meetings. This is based on past experience, the complexity, cost, importance of on-time delivery, and the extent of subcontracting of components of the equipment, as well as the location of the proposed Suppliers. The experience on the previous phases of the project will be a crucial point of reference.

During these alignment meetings, the Project team will go over the Suppliers ITP in detail, to gain a thorough understanding of the Supplier's execution strategy, including how they intend to manage and monitor their other sub-tier Suppliers and Sub-contractors. As a result of this review the Supplier's ITP, the Shop Inspection Checklist may be modified to capture the best surveillance value for this particular package. Alignment meetings may be conducted at both the Supplier's main office and primary manufacturing site, if warranted.

9.5.6 Shop Inspection Execution

The task of the Quality Surveillance Representative (dedicated third party inspector or in house project representative) is to verify that the materials/ equipments/components, processes, practices, workmanship, inspections, tests, measuring equipment, documents and records are in accordance with the applicable specifications, codes, standards and the Purchase Order requirements. The task is broken down into the following activities:

- Use of current and approved drawings, documents and applicable Code and Standards
- Use of calibrated measuring and testing equipment
- Monitoring of receiving/incoming inspection performed by Supplier
- Monitoring of in-process inspection performed by Supplier

- Monitoring of the Supplier's manufacturing or inspection special processes
- Monitoring of identification and traceability, when required, ensured by the Supplier
- Control of deficiencies and nonconformities
- Monitoring of preservation, packaging and shipping
- Quality records review
- Performance of final inspection
- Issue of inspection release

The Quality Surveillance Representative shall witness specified manufacturing operations, inspection and tests, if called for in the specifications and identified as witness or hold point on the Supplier Inspection and Test Plan. All performance test results are transmitted to the responsible Package Engineer for review and acceptance.

In the event that non-fulfillment of requirement to drawings, specification, codes and standards is identified, the Quality Surveillance Representative shall promptly report the variance immediately to the Quality Manager and the Package Engineer for action.

The Quality Control Surveillance Reports shall be logged in the PM+ System, reviewed and distributed for follow-up action. The Quality Records of these Reports shall be maintained by the Document Control Center.

9.5.7 Inspection Release

With the agreement of the Package Engineer, the Inspection Release shall be generated by the Quality Manager or his Representative for this equipment.

Before issuing an Inspection Release, this Representative shall ensure that all the relevant documents have been reviewed, all covering Nonconformity Reports have been resolved and all required inspection and test records reviewed and the final document is approved.

Copies of the Inspection Release shall be issued to both Expediting and Logistics and to the Supplier for attachment to the packing list.

9.6 CONSTRUCTION QUALITY CONTROL

This function provides assurance that the Contractors inspection and testing are performed in conformity with the approved Inspection and Test Plans.

9.6.1 Construction Quality Control Planning

The required resources to carry out the quality control activities to be performed by the Site discipline inspectors on the Work Package basis are planned based on the criticality level of the package.

The required resources to carry out the quality control activities to be performed by the QC inspectors are identified in the Quality Scope of Work.

9.6.2 Contractors Inspection and Test Plans Review

The review shall be initiated or continued at the site kick-off meetings with the Contractors, by providing supplementary instructions or comments to the Inspection and Test Plans already submitted by the Contractors.

The review shall result in the project developing a strategic planning program for Quality Control Surveillance whose purpose is to:

- Outline the Construction Quality Control Surveillance scope of work at site or at Contractor's facilities, as required
- Define the specific interfaces with the Contractors and within the Project
- Provide instructions and guidelines to the Discipline Inspectors or others for the performance of the Construction Quality Control Surveillance activities on the Project
- Determine the surveillance audit program upon Contractors as part of the Site QA Monitoring function
- Establish the routing and distribution of the Construction Quality Control Surveillance documents on the Project

9.6.3 Site QC Execution

The Discipline Inspectors assigned by the Area QA/QC Supervisor shall be responsible to perform on a regular basis the Work Package Quality Control Surveillance activities throughout the Contract.

The assigned Discipline Inspector shall contact the Contractor Quality Control representative to discuss and review the technical and quality requirements of the

Contract, including the applicable Codes and Standards and the project requirements, as well as the method of application for controlling quality.

The assigned Discipline Inspector is responsible for monitoring and completing all Quality Control Surveillance activities at the frequency compatible with the reviewed Contractor Inspection and Test Plan.

In essence, the task of the assigned Discipline Inspector is to participate in the QA Monitoring of Contractors organization, to verify that the processes, practices, workmanship used and that materials/equipments/components are constructed or installed, are inspected and tested in accordance with the applicable specifications, codes, standards and the Contract requirements and documented accordingly in pertinent documents and records. Usually the task is broken down into the following activities:

- Use of current and approved duly reviewed Contractor drawings, documents and applicable Code and Standards
- Use of calibrated measuring and testing equipment
- Monitoring of source/receiving inspection performed by Contractor
- Monitoring of in-process inspection performed by Contractor
- Monitoring of the Contractor's construction/ installation or inspection special processes
- Monitoring of identification and traceability, when required, ensured by the Contractor
- Controlling the deficiencies and the nonconformities
- Monitoring of the preservation, packaging, shipping and storage
- Reviewing of the quality records
- Performing the final inspection
- Participating in the issue of the Construction Final Inspection Release

The assigned Discipline Inspector shall witness during construction or installation any specific pre-operational inspection and tests, if called for in the specifications and identified as the witness or hold point on the Contractor Inspection and Test Plan. The Contractor shall be expedited to submit his weekly inspection schedule.

The assigned Discipline Inspector shall perform the following activities during final inspection:

- Verify during construction and installation that all inspection and test points have been completed in conformance to specified requirements
- Review the quality control records prepared and submitted by the Contractor
- Check that the Contractor records are complete and show adequacy and conformity to the Contract
- Issue a Quality Control Surveillance Final report
- Assist the Quality Manager in issuing Construction Final Inspection Release

9.6.4 Mechanical Acceptance Inspection Activities

The Discipline Inspector shall perform a formal inspection relative to Mechanical Acceptance of the subject system. The purpose of the inspection relative to mechanical acceptance is to complete and isolate the deficiency and incomplete work list and to schedule the correction of deficiencies in a prioritized sequence.

Prior to signature of the release for Mechanical Acceptance, a further review of the inspection and test records shall be carried out by the Area QA/QC Supervisor to conclude on the deficiency list and quality records status.

9.6.5 Construction Final Inspection Release

Before issuing a Construction Final Inspection Release, the Quality Manager shall ensure that all documents have been reviewed by the project, all covering Nonconformity Reports have been resolved, a Quality Surveillance Final Report has been issued and all required inspection and test records reviewed.

Prior to Construction Final Inspection Release, all required Requests for Concession shall have been closed out and all inspection and test records (Quality records) shall have been issued to the project.

9.7 AUDITS

9.7.1 Audit Program

The Project Quality Manager will establish, implement, monitor and improve the audit program, as well as identify and ensure provision, in conjunction with the corporate Quality Manager and Project Manager, of the necessary resources to conduct audits.

The Audit Program includes the detail of the established organizational Processes by department and related procedures to be audited and the scheduled dates. In all the

cases, selection of auditors and conduct of audits will ensure objectivity and impartiality of the audit process.

The audit program will take into consideration four (4) levels of exercises:

- Internal audits by the quality project team, including technical audits
- Supplier audits (at site or offsite) by the project team
- Peer review by cold eye specialists
- External audit by the third party registering the SLI corporate level

For the Internal audits and the Supplier audits, the Project Quality Manager will appoint an audit team leader for the audit. Management and leadership capabilities should be taken into consideration during this selection.

For the Peer review process, the team will be selected by the Project Sponsor. The independence of the peers has to be validated by Nalcor's Management personnel.

9.7.2 Audit Strategy and Audit Plan

The audit strategy will be determined based upon the objectives of the audit. Some options that will be considered are:

- Audit along the process flow
- Audit a selected area or department (vertical audit)
- Audit a selected group of procedures
- Audit based on a selected range of ISO standard (horizontal audit)

To formalize the audit strategy and all administrative arrangements with the auditee (internal, Supplier or external), the Lead Auditor shall prepare an Audit Plan. This Plan shall include:

- Audit objective
- Audit criteria
- QMS documents to be audited
- Auditee name
- Detailed dates

The management person responsible for the area being audited will ensure that actions are taken without undue delay to eliminate detected nonconformities and their causes. Follow-up activities will include the verification of the actions taken and the reporting of verification results. Technical Assessments also referred to as Technical Audits, will be conducted by independent lead discipline engineers to ensure that SLI technically conform to all requirements as indicated within the work packages.

10 PROJECT CONTROLS EXECUTION PLAN

10.1 INTRODUCTION

The Project Controls team is responsible for all project controls functions of the project, including planning, scheduling, progress control, progress reporting, cost management, change management and estimating. The key project controls tasks are as follows:

- Establish and manage the project controls functions, systems and procedures to ensure the definition of schedules and budgets and analyze trends and forecasts for effective project management.
- Manage the project controls functions within budget and schedule.
- Provide sound and timely cost and schedule data to the project team to facilitate the effective management of the project.
- Develop and maintain the Project EPCM Schedule and obtain the responsible leads and Managers' inputs to ensure their commitment to and understanding of the schedule.
- Initiate and supervise preparation and updating of the Project Schedule.
- Develop and maintain the control budget using the project WBS to meet the control and Client reporting requirements.
- Initiate and supervise implementation and updating of engineering, procurement and construction progress, performance and reporting.
- Implement a change management process to control all changes to the baseline schedule and control budget.
- Provide project controls processes to support the execution of the project in accordance with the plan and for measuring, analyzing and reporting any variations from the plan in a timely manner;
- Maintain excellent working rapport with the Client team based on mutual respect and common understanding of our respective roles.

10.2 ORGANIZATION

The project controls group reports to the Project Controls Manager (PCM), who is responsible to the Project Manager for the project functions of estimating, budget development, cost engineering, trending, cost control, change management, planning and scheduling, progress monitoring and reporting and document control.

The organizational structure of the Project Controls Group is shown below. A detailed Organizational Chart is shown in the Project Organization Chart 505573-0000-30AE-I-0002.

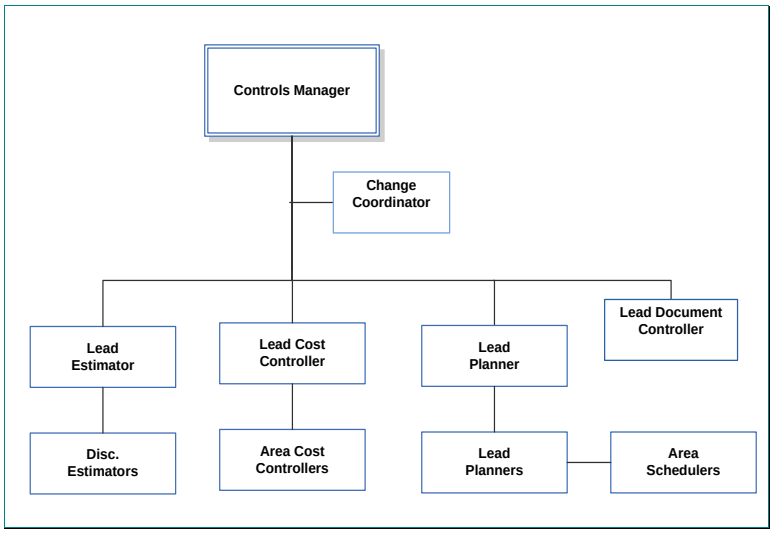


Figure 10-1: Project Controls Organization

10.3 PROJECT BREAKDOWN STRUCTURES AND CODE OF ACCOUNTS

The Project Breakdown Structures provides a project wide model providing a framework for project management and control. It allows the integration of project functions and defines the manner in which the Project is managed. The Project Breakdown Structures encompasses the complete Project scope and is used for estimating, cost control and scheduling of the project. It is divided into the discrete areas to provide the necessary level of detail for effective progress measurement, accountability and control.

The Project Breakdown Structures has been established to provide a natural hierarchy with the top level representing the total project and the lower levels reflecting successively increasing detail illustrating the manner in which the work is divided and implemented.

The Project Breakdown Structures will take into consideration the following elements:

- Work Breakdown Structure (WBS)

The WBS is the physical division of the project by area and sub-areas.

- Package Breakdown Structure (PBS)

Project deliverables are arranged for project execution into engineering, pre-purchased equipment, services and construction packages for execution.

Project deliverables are also arranged on an individual contract basis. It reflects the way the work will be performed and how progress will be monitored.

- Discipline Breakdown Structure/Commodity Resources Coding (CRC)

This is a breakdown of project costs by discipline commodity and resources codes.

- Asset Breakdown Structure (ABS)

The project's cost are divided in physical assets and grouped for tax purposes upon financial completion and close out of the project (use client's code).

- Organizational Breakdown Structure (OBS)

This is a depiction of the project organization arranged to relate work packages to organizational units.

- System Breakdown Structure (SBS)

Functional or operational based. This breakdown is used early in the project life cycle prior to approval to proceed and late in the project life cycle for commissioning and plant operations. Project deliverables are viewed as elements of an operating facility. The breakdown is a logical division of the physical assets into operating modules/systems based on the process flow sheets and piping and instrumentation diagrams.

Note: All coding structure variants must be fully integrated into a single database.

10.4 COST CONTROL

10.4.1 Cost Control Functions

SLI's approach to cost control is based on proven procedures that meet the requirements of ISO9000 Quality Systems, and the key features of our cost control functions include:

- Preparation and allocation of the Project budget.
- Gathering, verifying and reporting all Project commitments and payments.
- Recognizing and reporting project scope changes to the Change Coordinator.
- Monitoring actual commitments against authorized budget.

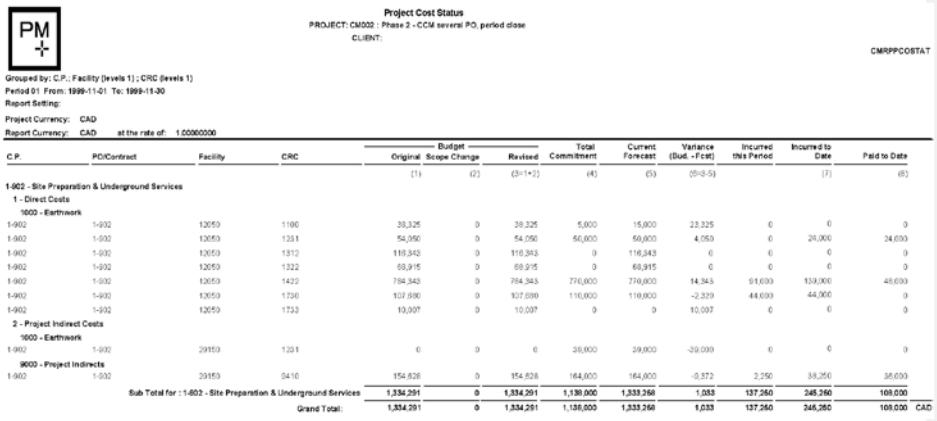
- Identifying and analyzing cost trends for project reporting.
- Taking corrective actions to meet budget.
- Forecasting the Project total cost.
- Contingency analysis (by Nalcor).
- Inflation/escalation management (by Nalcor).
- Keeping the project management team informed of actual and expected deviations from what has been approved, i.e. scope and cost.
- Preparation and monthly update of the project cash flow.
- Reporting for capitalization of assets (by Nalcor).

The SLI PM+ cost control system includes pre-formatted reports, which assist cost control in taking corrective actions to meet Project budget objectives. The PM+ system uses the work breakdown structure, based on actual execution packages, as the primary breakdown of the project. Purchase commitments, invoices and progress claims are entered directly into PM+ through the procurement module, which is fully integrated with the cost module. This avoids duplication of effort and data entry.

Engineering costs will be managed at the detailed task level in another module within PM+. These costs will be rolled up to PM+ at the summary level.

PM+ reports at various levels of detail against each execution package and has the facility to operate within multiple coding structures. Alternate coding structures allow the system to be operated to meet Client specific coding requirements, if required (e.g. break up into plant facilities), in addition to execution-based work package reporting.

PM+ is a live system and, therefore, reports can be produced at any stage to suit Project needs. However, project cost reports will be produced, approved and issued formally only on a monthly basis.



Project Cost Status
PROJECT: CM002 : Phase 2 - CCM several PO, period close
CLIENT:
CMRPPCOSTAT

Grouped by: C.P.; Facility (levels 1) ; CRC (levels 1)
Period 01 From: 1999-11-01 To: 1999-11-30
Report Setting:
Project Currency: CAD
Report Currency: CAD at the rate of: 1.00000000

C.P.	PO/Contract	Facility	CRC	Budget Original	Budget Scope Change	Budget Revised	Total Commitment	Current Forecast	Variance (Bud. - Fcst)	Incurred this Period	Incurred to Date	Paid to Date
				(1)	(2)	(3=1+2)	(4)	(5)	(6=3-5)		(7)	(8)
1-902 - Site Preparation & Underground Services												
1 - Direct Costs												
1600 - Earthwork												
1-902	1-902	12059	1100	38,325	0	38,325	5,000	15,000	23,325	0	0	0
1-902	1-902	12059	1231	54,050	0	54,050	50,000	50,000	4,050	0	26,000	24,000
1-902	1-902	12059	1312	116,343	0	116,343	0	116,343	0	0	0	0
1-902	1-902	12059	1322	68,915	0	68,915	0	68,915	0	0	0	0
1-902	1-902	12059	1422	784,343	0	784,343	770,000	770,000	14,343	91,000	139,000	48,000
1-902	1-902	12059	1730	107,680	0	107,680	110,000	110,000	-2,320	44,000	44,000	0
1-902	1-902	12059	1733	10,007	0	10,007	0	0	10,007	0	0	0
2 - Project Indirect Costs												
1600 - Earthwork												
1-902	1-902	29159	1231	0	0	0	39,000	39,000	-39,000	0	0	0
9000 - Project Indirects												
1-902	1-902	29159	9410	154,828	0	154,828	164,000	164,000	-9,372	2,250	38,250	38,000
		Sub Total for : 1-902 - Site Preparation & Underground Services		1,334,291	0	1,334,291	1,138,000	1,333,258	1,033	137,250	345,250	108,000
			Grand Total:	1,334,291	0	1,334,291	1,138,000	1,333,258	1,033	137,250	345,250	108,000 CAD

Figure 10-2: PM+ Example of PM+ Cost Report

Key data includes a comprehensive coding structure, the full detail of the definitive estimate and all commitments. Reports for budgeting, monitoring of commitments payments and forecasts are provided. A concise cost statement describing the project on one page and supported by detailed information will also be produced.

The Project Master Scope document is the reference against which potential scope changes are determined. As each bid package is prepared, the scope of the package is compared to the budget to ensure comparative scope.

The Project Breakdown Structure is used as a means of identification for all items during estimating and cost reporting and allows sorting and summarizing of the data into predetermined groupings.

10.4.2 Budget Control

Cost control will be achieved by setting man-hour budgets that are issued to the responsible area and Functional Managers. Cost control personnel will monitor actual expenditures and commitments against the established budget, identifying trends early, accurately forecasting costs to permit the responsible manager to take corrective action in a timely manner to ensure successful execution of the work within budget.

The cost engineer will derive the control budgets from the project estimate covering all phases of execution e.g. engineering, materials management and construction

costs. The budgets will be disseminated to key personnel and cost data will be provided so that cost performance can be monitored.

Promoting cost awareness at all levels of the project will be a critical element in achieving effective project cost control. The provision of the detailed technical basis of the budget will improve awareness of major cost issues within the technical disciplines.

10.4.3 Commitments

EPCM Commitment will be taken from SLI's time analysis system for man hours and costs during the engineering phase, per discipline.

Material commitments will be taken from **PM+** for managing equipment and bulk materials at the requisition and purchase order level and coded to the appropriate discipline code.

Construction commitments will be from the **PM+** contracts module and will identify the commitment for each awarded contract.

10.4.4 Cost Reporting

SLI Code of Accounts and Contract Numbering System will ensure the visibility and traceability of costs. The reporting structure will reflect the agreed cost breakdown structure and provide for cost allocation by project area as required. Costs reports will be updated continuously with incoming data and issued monthly. Reports will be structured to the cost breakdown structure and will provide details of budget, commitment, expenditure and forecast. Foreign currencies will be converted to the master project currency (US Dollar) in accordance with project exchange rates established in the basis of estimate.

Working documents that provide full cost visibility of the status of all purchase orders and construction contracts will support the formal cost reports. These documents will not form part of the monthly cost report but will be available for review with Nalcor.

Cash flow forecasts will be issued each month showing monthly values for the following four quarters and quarterly values thereafter. The cash flow will be sorted to show expenditure profiles by currency of expenditure.

10.4.5 Quantity Control

Responsibility for quantity development and tracking will vary throughout the life of the Project. Quantity tracking is primarily used during the construction phase of the project. However it will also be used during the engineering and procurement phases to track trends and to ensure adequate quantities of materials are available to the project.

Engineering phase: During this phase, the project control estimate will form the basis for monitoring the design. Material Take-Offs (MTO) will be compared to budget quantities derived from the control estimate to continuously monitor variances as the design process moves forward. The objective is to progressively achieve a more exact definition of the project scope. At the completion of detailed engineering, it is expected that quantities will be essentially fixed and only subject to minor field changes. The engineering disciplines are accountable for tracking and managing the quantities during the engineering phase.

Procurement phase: Monitoring of quantities during the procurement phase will be undertaken by the Materials Management Group (MMG). During this phase, MMG will use PM+ to identify quantities of materials ordered, received and issued. They will also liaise closely with engineering who will ensure that material requisitions are revised if the designed quantities of bulk materials, or engineered equipment change.

Construction Phase: During the construction phase, the construction team will monitor the actual quantities installed on a weekly basis based on contractor's reports.

Throughout the Project any significant changes in quantities will be highlighted through the trend system and the issue of a monthly quantity tracking report will show the progressive development of quantities, by area, as the design progresses.

Prior to the commencement of the quantity tracking activity, a general plan for implementation is to be developed. Commodities to be tracked will be identified, the type of quantity tracking system to be used will be selected and organizational responsibilities for the input and maintenance of data will be determined and assigned.

Input for the quantity tracking system comes primarily from engineering prior to the construction phase of the Project.

10.4.6 Change Management

The change management process will follow a formal change control procedure. The process will be managed by the Change Management Coordinator. The fundamental philosophy is to obtain early advice such that strategies can be put in place that will:

- provide the project team with an orderly procedure for the recognition and evaluation of project change;
- allow the project team to control the impact of changes and develop mitigation and implementation plans;
- provide timely communication and distribution of the disposition of changes;
- provide the basis of obtaining approvals for all manner of changes, and ensure that the appropriate cost budgets and schedule baselines are adjusted to reflect approved changes; and
- ensure that forecast final costs and schedules are adjusted to reflect approved changes and trends.

10.4.7 Forecasts

Cost forecasting will be a key cost engineering activity through all phases of the Project with the emphasis on early identification of trends for management. Productivity curves, manpower histograms and man-hour rate controls covering all engineering disciplines are used during the design phase.

Material, equipment and construction costs will be forecast based on sample trends, and MTOs updated to reflect the total scope of work. Material cost trends are identified from the earliest stages of the requisitioning process and calculated from bid summaries and material quantity forecasts received from engineering. Equipment cost trends will be based on bid analysis and identified design growth reflected in requests for variations.

The impact of design development on construction costs will be continually assessed during the early phases of the Project with estimated material quantities being reviewed against latest take offs purchase and contract enquiry packages. Details of construction cost budgets will be established at site and controls set up to monitor field instructions, day work, schedule and manpower trends; and scope changes. Factors impacting on construction costs will be kept under review through rate and quantity tracking, close monitoring of direct labour progress and productivity and the review of commercial issues.

10.4.8 Management of Contingency

Nalcor will develop a contingency for the project and will manage the contingency.

10.4.9 Forex Management

The purchase of foreign currency and hedging will be managed by Nalcor. SLI will assist by preparing cash flows in source currencies indicating future expenditure requirements.

Costs will be reported in Canadian dollars and foreign currencies will be converted at the exchange rates established in the basis of estimate.

Forex costs will be calculated based on Nalcor's actual payment exchange rates and will be reported as a separate line item.

Cash flow forecasts will be issued each month showing monthly values for the following two quarters and quarterly values thereafter. The cash flow will be sorted to show expenditure profiles by currency of expenditure.

10.5 ESTIMATING

The capital cost estimate prepared for Gate 3 will be used to prepare the Project budget.

On completion of the Project Estimate, the estimating team will focus on tender check estimates, changes of scope and Contractors' claims, drawing changes, site instructions, and project engineering variations.

The Estimate will be re-casted in various Project Breakdown Structures for control purposes.

10.6 PLANNING AND SCHEDULING

The Planning system is based on detailed logic networking using PrimaveraP6 Enterprise Project Portfolio Management (Primavera). All schedules will be in a consistent and compatible format.

The Critical Path Method (CPM) technique of planning and scheduling will be used for the project.

The Planning and Scheduling team will develop the following:

- Management level schedule (Level 1)

- Project coordination schedule (level 2)
- Detailed EPC Control level schedule (Level 3) will be developed for stage Gate 3 for the start of the EPCM execution phase of the project

Schedule risk analysis will be performed on the Level 3 schedule and submitted for review and approval by Nalcor to establish the baseline schedule.

Throughout the execution phase, the Level 3 Schedule will be updated in Primavera on a monthly basis as per the project reporting calendar. A six week look-ahead schedule will be prepared on a weekly basis and will be reviewed and discussed during weekly meetings with disciplines. A 90-day look-ahead schedule will be prepared on a monthly basis from the Level 3 schedule and will be reviewed and discussed during the monthly progress review meeting.

Updated schedules will be published in the Monthly Progress Report, showing current status compared to the baseline schedule. Significant changes will be identified through the change management process to ensure the project management team's awareness. All schedule reports will be prepared as per the Project Procedure manual (PPM) and will be reviewed and discussed with Nalcor.

A Risk/"What if" analysis as required by Nalcor will be performed to ensure that Project Management team is well informed of the development of any critical changes and to provide early warning of the need for corrective actions.

10.7 PROGRESS MEASUREMENT

10.7.1 EPCM Progress Measurement

EPCM progress will be monitored both from a schedule and a performance point of view. This will be accomplished by the combined use of Primavera and the Internal Mandate and the Document Control modules of PM+.

The EPCM team produces documents required to the issue and progress of Commitment Packages (CP) or PO/Contracts. The CPN report of the Internal mandate manages the dates (planned, forecasted and actual) of the CP or PO/Contract milestones To guarantee the full coverage of the project scope, the list of CP and PO/Contract showing in the CPN report is the same list shared by the all PM+ modules. The schedule information associated to the milestones is imported from Primavera.

The performance aspect of EPCM progress will be monitored with the Work-Hour Control functionality of Internal Mandate of PM+. The tasks of each disciplines required for a CP are grouped by Internal Work packages (IWP). Each task can be associated to one or many deliverables. The Budgeted and Forecast to complete hours are defined at the task or the deliverable level. Earned hours are calculated at the lowest level. Actual hours spent at the IWP level are extracted from the project timesheet system.

To improve the management of EPCM work-hours and to take advantage of the interface between the Internal Mandate and Document Control modules of PM+, the project will use an improved import function of documents data from SPF into PM+. By importing the document status of the documents, PM+ will be able to generate automatically the progress of tasks/deliverables in the Internal Mandate. This will reduce the time required for the periodic updates and improve the quality of the engineering progress measurements.

10.7.2 Construction Progress Measurement

Construction progress monitoring will be done both at the area and contract level. The project will take advantage of new development in SNC-Lavalin's integrated project management system.

Construction contract progress will be based on pay item quantities committed, forecasted and executed. Construction progressing will be done with the new functionalities and graphical reports developed in PM+. This way construction progressing data will be automatically synchronized with the other modules:

- Original committed quantities and planned progress will come from the commitment screen.
- The revised forecast quantities and progress will take into account the committed and in-progress contract changes processed in the Contract Administration screens.
- An optional synchronization can link the quantities of the Progress Billings to the executed quantities of construction progress.

10.7.3 Fabrication Progress measurement

Fabrication progress will be monitored with PM+. New functionalities were added to allow the monitoring of PO/Contract fabrication progress either at the PO/Contract or

the pay item level, as defined by the purchaser. The progress can also be related to tag equipment or bulk material, object of the PO/Contract, if this information is associated to the pay items at the time of commitment. Percentage progress can be tracked globally or with the use of predefined progress templates based on standardized activities.

A detail fabrication progress report will be produced monthly and a summary one will be included in the Project Monthly Progress report.

10.8 REPORTS

10.8.1 Monthly Progress Reports

The approach to reporting in accordance with the procedure 3110-MMG-E guiding principles will be essentially forward looking aimed at preventing or correcting non conforming Project activities.

Monthly progress reports similar to Phase 1 will be produced and issued within ten (10) working days of the last Wednesday of each month, which will be the cut off for the progress reported. The report will include an executive summary and a detailed report. The executive summary will include:

- a management foreword summarizing the highlights of the period i.e. H&S statistics, Environmental statistics, project milestones achieved, main decisions reached, main problems solved, outstanding problems and/or new problems arising;
- a work schedule analysis highlighting slippage of activities or progress shortfalls which adversely affect the work schedule. Particular reference to the critical path and the impact on project milestones and work completion will be included;
- a strategy and plan for the implementation and timing of recovery actions shall be explained;
- a safety summary reporting achievements in the reporting period, incident/accident statistics, results of investigations and current objectives, and safety performance together with remedial action and follow up related to the overall project and individual worksites;
- a summary progress table showing period and cumulative actual versus planned and forecast;
- a Level 1 progress control curve showing period and cumulative actual versus planned and forecast; and

- a summary manpower histograms for engineering and construction. The number of planned and actual personnel will be shown in tabular format; and
- an updated Level 1 project schedule;

The detailed report will include:

- a detailed narrative highlighting the main events for each work area including status of objectives planned for period ended, objectives for next period, areas of concern and actions to be taken by Contractors and Vendors;
- detailed contract progress tables showing period and cumulative planned and actual;
- Level 2 progress control curves, i.e. for engineering, procurement, construction and Level 2 overall project schedule; updated manpower histograms.
- updated construction report(s) illustrating the status and quantity of installation of the major construction work;
- QA status summary covering audit activity, deficiency and non conformity reporting, summary of corrective actions;
- Local benefits reporting
- Environmental reporting
- Interface reporting
- trend and project change order status report;
- updated CPN schedule; and
- photographs of site.

10.8.2 Weekly Reports

SLI will submit weekly construction management reports covering key activities at the construction site. The weekly progress report will contain:

- A highlight of safety issues, if any.
- A brief narrative on achievements, activities planned for the coming period, critical activities, and problem areas.
- An exception statement on late issues of drawings and documents per contract.
- An exception statement of any critical Contractor's drawings not received or returned during the period.
- A manpower statement by discipline for the week, actual versus planned, and planned for the next week.

- An exception statement of delivery status of equipment and materials for the week.
- A statement of recovery actions to be taken for activities behind schedule.

Any deviations or additional reporting requirements will be discussed and agreed to with Project Team during the coordination meetings at the start of the project.

10.8.3 Project Closeout Report

At project completion, the Project controls team will coordinate the preparation and the issuance of a project closeout report to provide a single reference of all the key issues involved in Project. As well as summarizing key data project statistics performance evaluations of major Contractors and Lessons Learned for any future work on similar projects. See section procedure 3112-MMG-E.

SLI has established strict security policies and a proven backup infrastructure with documented procedures to ensure the availability and integrity of data in the event of hardware failure.

10.9 DOCUMENT CONTROL

10.9.1 Document Management System

The Project will be using PDM to control and monitor the coding of documentation on the Project.

10.9.2 Project Document Numbering

All documentation must be codified in accordance with the project requirements to ensure that each document has a unique identification and traceability.

10.9.3 Engineering Documents

SLI generated design documentation will be recorded both electronically in PDM and held in original hard copy format. Original wet ink signed documentation will be submitted to the Document Control Group under cover of a document issue request form. The issue request will contain all instructions required by Document Control to accurately record and distribute the documentation to the project recipients.

The document distribution matrix will be updated regularly to reflect new project personnel and distribution requirements. Confidential documentation will be stored in locked cabinets within the document control room.

10.9.4 Vendor Documentation

Vendor and EPCM Sub-contractor documentation will be recorded in PDM as Vendor deliverables.

10.10 HANDOVER OF DELIVERABLES TO CLIENT AND ARCHIVING

Engineers will prepare and assemble the 'as-built' documentation for the project for hand over to Nalcor. The engineering record will be transferred electronically to Document Control at project closeout.

SLI will create a copy of the drawings for its own files in accordance with contract requirements.

For further details of project closeout please refer to Global M&M procedure 3113-MMG-E.

11 OFFICE SERVICES AND ADMINISTRATION EXECUTION PLAN

11.1 OBJECTIVES

The Office Services and Administration team shall provide the necessary support to the Project Execution Team and shall manage the Offices Services, Human Resources, Information Technology, Finance and Administration activities with the utmost care for quality, transparency and accuracy. The Office Services and Administration team shall fulfill their roles with the objectives to:

- control costs and provide professional service to the SLI Project Team;
- maintain excellent working rapport with Nalcor's team based on mutual respect and common understanding of our respective roles;
- establish proven accounting and administration procedures that promote transparency and efficiency;
- maintain the integrity of cost data using PM+ project control system and SLI accounting system;
- record and report project accounting data accurately and professionally in accordance with Nalcor's code of accounts;
- process Nalcor's invoices accurately and in a timely manner in accordance with contractual terms and as per the procedures established in the Cost Management Plan (Document # 505573-0000-34RA-I-0001);Work with project team to prepare accurate and timely cash/currency and expenditure forecasts;
- Provide hiring, inductions, project communications and management of the human resources required for SLI's scope of work;
- Manage the installation, operation and maintenance of the project IT system, which will serve all of the Project Home office as well as all remote sites;
- Administrative and logistic support to all construction sites.

11.2 ORGANIZATION CHART

The organization chart for Office Services and Administration is shown in the APPENDIX C, Chart 2A. The Office Services and Administration Manager reports directly to the Project Manager and shall be responsible for all activities included in Office Services and Administration

The Finance and Administration departments of Office Services and Administration shall provide the following services to the Project

- **Finance (Accounting)** shall consist of the following services:
  - Administration, attest and processing of accounts payable (invoices) on behalf of Nalcor as per the Cost Management Plan (Document # 505573-0000-34RA-I-0001). Vendors' invoices shall be submitted to Nalcor for payment once the attest process is complete and all necessary approvals have been obtained.
  - EPCM General Accounting consisting of checking and processing expense reports, checking and validating invoices related to EPCM services (utilities, housing, etc.), processing payments, and making sure that data is entered correctly in the accounting system.
  - EPCM Invoicing as per the Invoicing and Payment Plan (Document #505573-0000-34RA-I-0003), consisting of preparing EPCM invoices to Nalcor as per the Agreement LC-G-002 (Agreement). This function shall also coordinate with the relevant parties to gather and submit to Nalcor any required documents to support EPCM invoices and audits.
  - Accounting system data entry and maintenance to test data integrity and generate reports for the end of the month.
  - Preparation of cash/currency forecasting as per Nalcor's requirements.

The Project Accountant shall report to the Office Services and Administration Manager and shall be responsible for the planning and execution of all accounting functions, and management of his assigned staff. The Project Accountant shall also be responsible for the coordination with Nalcor's counterpart in relation to all accounting matters including administration of Nalcor's accounts payable, EPCM invoicing, audits, etc.

- **Administration** shall be managed by the Office Administration Coordinator who shall report to the Finance and Administration Manager. The Administration function shall consist of the following services:
  - Project Management Office coordination including assignment of office space to EPCM employees, providing office equipment (desks, chairs, telephone landline) and supplies, management of Sub-contractors for office maintenance and janitorial services, maintaining an office asset register, preparation and maintenance of offices telephone directory, etc. The office coordinator shall obtain prior approval from Nalcor of any reimbursable third party services in accordance with the Agreement..

- IT services coordination with IT Manager
- Transportation including management of busses for EPCM local employees and site commuting, vehicles for office-related activities, pickups to and from airports for EPCM employees, arrangement of vehicles rental for EPCM employees, etc. This work will be performed at both the St. John's Project Office and the site
- Other administrative functions including administration of mobile telephones, BlackBerry service, business cards, and managing mailroom for SLI, etc.
- Manage travel services, including the process of controlling air tickets for business travel, Project approval of business travel, reservation of accommodation and transportation for business travel, and any other tasks related to Project travel.
- Coordinate housing with HR to get timely information about employees who will be assigned to the Project. Housing coordination shall consist of arranging temporary and long-term housing for expatriates, administration of housing leases, utilities and maintenance requirements, accommodation for business travel in the country, assigning local employees to the site camp, coordination with Accounting for leases payments and deposits, and any other tasks related to housing.

11.3 OFFICE SERVICES AND ADMINISTRATION EXECUTION PLAN

The Execution Plan for Office Services and Administration described hereafter capitalizes on SLI's Lessons Learned during Phase 1, which have served as guiding factors in the formulation of the Plan. The following are some key initiatives of this plan:

- **Start-up resources (staffing):** Mobilize immediately the core Finance and Administration team at the beginning of the EPCM mandate in order to establish this function properly. The core team includes the Manager of Office Services and Administration, Project Accountant, and the Project accounts payable specialist

The start-up core team shall establish the administrative procedures and policies as soon as possible, get employees up and running so they are functionally trained right from the onset (higher productivity), handle accounts properly and accurately, have

better control over expenses such as housing, and establish good rapport with the Nalcor finance team as soon as possible.

Establishing procedures and policies immediately should have many benefits to the Project, such as transparency and elimination of confusion among employees with respect to administrative issues, better control over handling accounts and establishing clear understanding with the Nalcor finance team right from the outset.

Setting up the accounting system right from the beginning has enormous benefits such as higher accuracy in financial recording and reporting, higher productivity of accounting staff and meeting Nalcor's reporting and audit requirements immediately.

- **Kick-off coordination meeting with the Nalcor Finance Team:** Finance and Administration core team shall conduct a coordination meeting with the Nalcor finance team as soon as possible and preferably during the first week of the EPCM mandate in order to establish common understanding of the EPCM contractual requirements related to finance and administration. In particular, routine audits and EPCM invoicing shall be discussed during the meeting.

  The coordination meeting with the Nalcor finance team shall be conducted to help understand expectations and chart the way for good working relationship based on common objectives and gaining an understanding of the Project requirements.

- **Travel services:** This function shall be outsourced to a supplier offering the best services and costs. Finance and Administration shall manage travel services to control costs and ensure that employees are receiving the best services to avoid any delays in reporting to work. Regular reporting of Project travel costs as per the Project codification system shall be a requirement among of the travel services.

- **Staffing:** Staffing of the Finance and Administration function shall be done gradually and responsibly in order to control budget and at the same time provide the needed services for the Project. Local employees shall be given priority in staffing Finance and Administration.

- **Coordination meetings with the Nalcor Finance Team:** SLI's Finance and Administration shall maintain regular meetings with the finance team and other concerned parties to address any issues, plan for work properly and renew our commitment to work towards the same project's goals.

The frequency of regular coordination meetings shall be agreed with the finance team during the kick-off meeting.

- **Tools and systems:** The Finance and Administration function shall use the following tools and systems to carry out all accounting and administration functions:
  - SLI's project management system, PM+, to record and process contractor's invoices (A/Ps)
  - SLI Accounting system, to record, manage and report all costs and expenses
- **EPCM invoices:** SLI shall prepare the monthly EPCM invoices as per the Agreement and any subsequent amendments reached upon mutual agreement between the parties to the contract.
- **Audits:** SLI's Finance and Administration team shall comply with the audit requirements as per the Agreement. Routine audit requirements related to monthly EPCM invoices shall be discussed and agreed with Nalcor's finance team.

11.4 HUMAN RESOURCES

11.4.1 Scope

This section outlines SLI's human resources (HR) plan for the construction of the Project. HR's mandate will encompass hiring, inductions, and management of the human resources required for SLI's scope of work.

11.4.2 Organization

SLI's project-wide human resource requirements will be managed from the main project office. The Project HR Manager will report to the Office Services and Administration Manager.

All HR-related issues at site will be channeled through the HR Manager. The HR group will have a full-time recruiter to facilitate staffing of the project

11.4.3 Personnel Assignment

EPCM staffing requirements will be based on the requirements of the Manpower Forecasting and Leveling (MFL) plan and each position must be requested and approved via a Personnel Assignment Authorization Form (PAA). Persons will be

assigned to the Project in accordance with the terms of the EPCM contract. All SLI positions will require the approval of SLI's and Nalcor's General Project Manager.

11.4.4 Project Assignment Conditions

Project assignment conditions for expatriates and locally hired working in the country (or in other project related locations away from the individual's home office) shall comply with the EPCM services contract. All SLI assignment conditions will be reviewed and approved by Nalcor.

11.4.5 Immigration

All expatriates working on the Project will have to comply with the requirements of Canada. Temporary foreign workers strategy will require Nalcor approval..

11.4.6 Induction/Orientation

Induction and orientation sessions will be held for all persons working on the Project. The content of these sessions will vary depending on the task to which the individual will be assigned.

Orientation for persons working in the engineering offices will basically include a general overview of the Project, an introduction to H&S on the project, office rules and procedures, confidentiality, project procedures, hours of work, timesheets, travel procedures and access to the Project IT systems. After the general orientation personnel will be given a more specific introduction to the project by members of their discipline.

All persons who are required to work at the construction site will have to undergo a construction site orientation and induction prior to being granted access to the site and will receive an LCP site handbook. Similarly, anyone who is required to provide assistance to Nalcor, or who has reason to be in the facilities once they have been handed over to Nalcor for commissioning and start-up, will be required to take a Client-specific induction and orientation course specific to the area of the plant in which they will be working.

11.4.7 Project Communications and Employee Relations

A process will be established to ensure the timely dissemination of relevant project information to staff. An effective performance management process will be implemented to ensure individual and team goals are aligned with project deliverables

and milestones and performance is focused and maximized. There will also be increased and regular opportunities for management and staff input and dialogue..

11.4.8 Monitoring and Reporting

Monitoring and reporting of EPCM staffing will be by means of the bi-weekly updating of the MFL, which will be reviewed with Nalcor. Staffing requirements will be reviewed weekly by all Managers and Discipline Leads (Recruitment Activities Spreadsheet).

11.5 PROJECT IT SYSTEM

11.5.1 Introduction

The Information Technology (IT) group is responsible for the installation, operation and maintenance of the project's IT infrastructure and systems, including the Local Area Network (LAN), hardware, software and telephony.

11.5.2 Organization

The IT Manager will report to the Office Services and Administration Manager in the performance of these duties.

11.5.3 IT Systems Management Plan

To provide IT services for the Project, SLI will capitalize on the extensive IT infrastructure. The infrastructure put in place for similar projects has proven to be one of high performance and reliability. The network design in place is based on similar successfully operating networks supporting major projects in remote regions and around the world. The schematic of the network is shown below. The network diagram as shown below leverages the use of existing telecom links.

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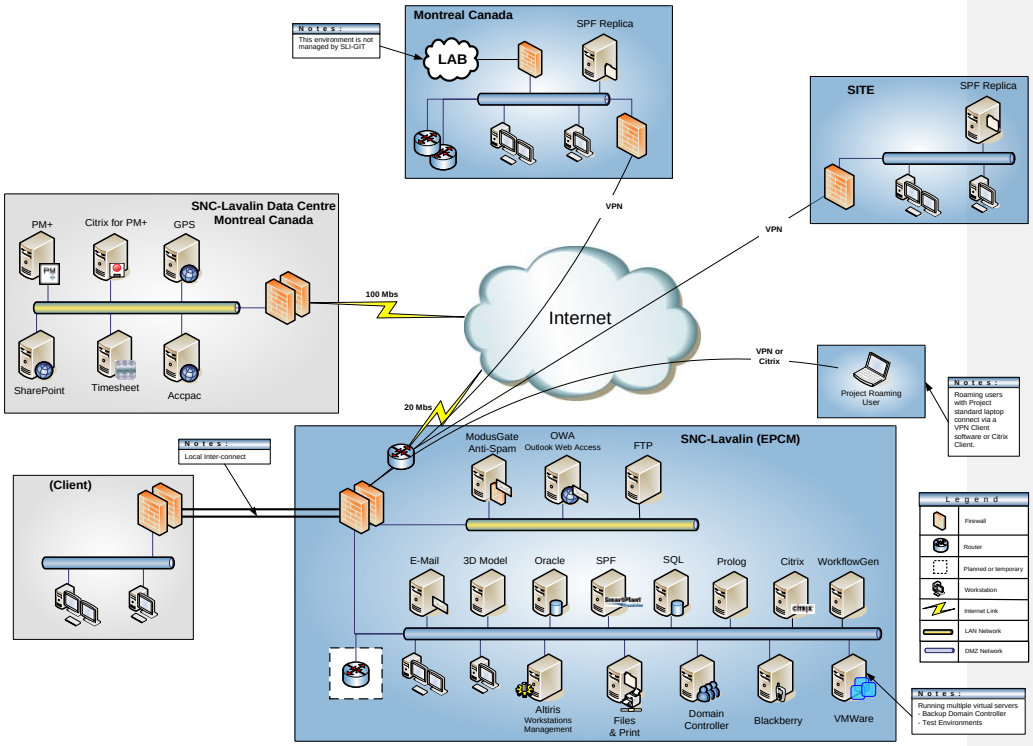


Figure 11-1: IT Network

SLI will use state-of-the-art computer systems, hardware and software for all phases and disciplines of the project including engineering and design functions. Project computers, notebooks and CAD/GIS workstations (PCs) will be connected via local area networks (LANs) to take advantage of common databases, file & resource sharing and a large inventory of software. This will be complemented by a number of in-house developed key applications. These tools will allow for effective management of the project. Fiber optic links will be deployed to connect satellite offices to the main project administration building within a work site.

Wide Area Files Services (WAFS) technology will also be used to maximize the performance of file transfer and reduce bandwidth costs. The project LAN will be connected to a Wide Area Network (WAN) which will enable collaboration with the other sites involved in this project.

SLI proposes to use proven project systems and tools for the execution of the project. A dedicated IT support group will be located on the project to support the users and the infrastructure. The local support team will be backed by the SLI corporate help desk which provides 24/7 support to users around the world.

In order to ensure confidentiality and access to sensitive information, all project data will be hosted at an SLI office; no data or email will be stored at a third-party office. SLI has established strict security policies and a proven backup infrastructure with documented procedures to ensure the availability and integrity of data in the event of hardware failure.

11.5.4 Hardware and Software

11.5.4.1 Hardware

The Project and Site Offices will be outfitted with servers that are capable of processing the projected project workload. Employees will be provided with one of four types of standard computer workstations depending on their duties:

- Office workstation (standard)
- CADD/3D/GIS workstation
- Office laptop
- CADD/3D/GIS laptop

The main specialized software used on the project is listed in Table 11.1 below. Specialized software purchases will be on the basis of proven need subject to Functional Manager approval.

11.5.4.2 Project management systems

PM+. SLI's integrated Project Management System, combines advanced interactive computer technology with proven project management methodology. PM+ is a tool set integrating Document Management and Control, Engineering Progress, Cost Management, Material Control Management and Construction management.

11.5.4.3 Software

The following is on non-limitative list of software that will be used by engineering:

Table 11-1: Project Software

Provider	System	Description
Adobe	Acrobat Standard / Professional	Document Assembly
	Acrobat Reader	Viewing PDF
Autodesk	AutoCAD	3D Design drawings including P&IDs
	Autodesk Civil 3D	Civil Design
	TrueView	Drawing Viewer
Bentley	Bentley Staad	Structural Analysis
	Bentley View	CAD Viewer
COADE	Caesar2,SEPipe,Compress	FEA / CFD
CYME	CYME PSAF	Transmission & Industrial System Analysis
	CYMFlow	Power Flow Analysis
	CYMFault	Short Circuit Analysis
Dassault Systems	Catia	3D Modeling/Solid modeling
EMTP	EMTP-RV	Transients analysis
ESRI	ArcEditor	GIS, Survey & routing
	ArcGIS Spacial Analyst	
	ArcGIS 3D Analyst	
	ArcGIS Publisher	
Google	Google Earth Pro	Geography, Navigation & Mapping
Hearne	Flow of fluids premium (Pipe Flow)	Fluid analysis
Manitoba HVDC Research Centre	PSCAD Pro	Power system analysis
Mathsoft	AutoCAD 2D	2D Design drawings
Microsoft	Office Standard / Pro	Docs, spreadsheets, presentations & databases
	Visio	Org Charts, Schematics
	Project	Scheduling
Power Line Systems	PLS-CAD	Transmission line design
	Tower	
	PLS-Pole	
	SAP	
Rockwell	SFrame	Structural analysis
	RS Logic	Programming software (PLC)
	Program Development Software	Programming for Level 2 & 3
Rocscience	SLIDE V6	Slope stability design
PTC	MathCad Enterprise	Engineering calculations
Structural	SFrame Pro for Window	Analysis & design
	B Line	Structural steel Design
	S Concrete	Struct. Concrete Des.
	S Steel	Structural Steel Design
	PCACOL	Struct. Concrete Design

11.5.4.4 Project Document Management and Control

PDM was developed on SLI projects to provide an efficient document management solution. It was successfully used to manage, share and control all documents; administrative, technical and supplier documents. An export function was also developed to transfer a minimum of information in PM+.

11.5.4.5 Planning and Scheduling

Primavera will be used to plan, schedule, and control the program. It will also be used as one of the tool to balance resource capacity and track progress.

Primavera information interfaces with some modules of PM+:

- Internal mandate (CPN: Commitment Package Scheduling report), Expediting (Fabrication Schedules) and Construction (Progress)

11.5.4.6 Risk Management

MOINS · RISC · LESS is an in-house designed Risk Management tool running on the Dyadem International Stature software platform. It's a Web Access application supporting SLI's methodology to manage Project Risks.

MOINS · RISC · LESS

11.5.5 Systems Integration

The strength of various systems resides in the integration between these systems. The main project management system PM+ interfaces with each of the other ones allowing the project mandate to be fulfilled in an efficient and economical way.

Major Project Management Systems are hosted in SLI's Head Office in Montreal and accessible via Internet by project members located around the world. The advantages of this approach are:

- Systems support by a complete team of specialists (Stronger team of business analysts, systems architects, programmers, help desk, etc.)
- Easier integration of data between systems

- Improved security (controlled access, stronger infrastructure, back-up procedures, Disaster Recovery Plan for some systems, etc.)
- Improved collaboration between all project offices using most efficient communication means and Wide Area Files Services (WAFS) technology.

PM+ is an integrated management system covering engineering and services management, material control management, cost management and construction management. In addition to the integration of its own modules, PM+ shares or exchanges data with various other specialized systems used by project team members.

PM+ has-built-in functionalities to import scheduling information from Primavera to complement and add value to project management data such as commitment package schedule, fabrication schedule from Vendors, construction progressing.

The Global Procurement System gets the procurement planning and the Request from Engineering electronically from PM+. Once the bid cycle activities are completed in PM+ by Procurement the details of the purchase orders can be exported in PM+ to feed the cost and material management modules.

12 ENGINEERING EXECUTION PLAN

12.1 SCOPE

Engineering will take advantage of all the preparation work made in the previous phase. In order for the engineering to be made in the most efficient way, most of the previous phase documentation will be reused after review, “Lessons Learned” and updates/upgrades are incorporated.

The Engineering Group will prepare the technical documentation for the design, procurement, construction, pre-commissioning and commissioning of the Project facilities.

Engineering will perform detailed engineering and provide ready for construction drawings and documentation in accordance with best practice as determined by:

- the project schedule;
- the contracting strategy;
- H&S design criteria;
- Environmental guidelines and criteria
- project resources; and
- Contractors’ and Vendors’ engineering resources and capabilities.

Engineering specifies and monitors the quality of engineering documents supplied by others required for effective plant construction and operation.

12.1.1 The Engineering Department

The Engineering Department will be the responsibility of the Engineering Manager for each Component to whom the following engineering disciplines will report:

- architectural;
- civil;
- structural;
- geotechnical
- geology
- hydraulics
- mechanical including piping and building services;
- electrical;
- instrumentation and control; and
- telecoms.

The main deliverables of the Engineering Department in the execution phase will be:

- Discipline design criteria identifying key elements for each discipline to be used
- Standards specifications when applicable
- Specific technical specifications describing the specific technical requirements Requisitions for purchases and contracts providing specific scope information for each package
- Layout and general arrangement development
- Detailed design of the services and utilities including coordination between packages
- Bid analysis and technical participation in the pre-award negotiation process
- Reviewing and coordination of Vendor information
- For turnkey contracts: participation in the detailed coordination and review of Contractors' engineering work including coordination of technical interfaces
- Lead participate (as appropriate) in risk, H&S, Hazop and constructability reviews
- Construction support
- Vendors' technical document review including the Operation and Maintenance manuals
- Support Pre-commissioning and commissioning in document preparation and collation

12.2 ORGANIZATION

12.2.1 Engineering Execution Location

SLI Engineering will be executed at the project Office. Where practical, 100% of the engineering will be carried out in Newfoundland and Labrador as per the Lower Churchill Benefits Agreement. Specialized engineering may be carried out in other SLI offices

12.2.2 Engineering Organization

For each Component, Engineering has been established as a matrix organization with an Engineering Manager, Lead Discipline Engineers and Discipline Engineers and Draft-persons. The technical quality of the work is the responsibility of the relevant Lead Discipline Engineers.

12.2.3 Organization Chart

The engineering team organization is for each component is in APPENDIX C, Chart 4 and 4A for Component 1, Chart 6 for Component 3 and Charts 5 and 5A for Component 4.

12.2.3.1 Engineering Manager

The Engineering Manager is responsible for the organization, methods, quality, resource management and timely execution of engineering work. The Engineering Manager:

- has the authority to select and approve all engineering personnel, review performances, and approve and issue engineering documents;
- is ultimately responsible for the execution of the engineering deliverables;
- answers to the Project Manager and coordinates the engineering work with other functional disciplines such as project controls, procurement and construction; and
- initiates engineering progress review meetings on a weekly basis.

12.2.3.2 Lead Discipline Engineers

The Lead Discipline Engineers report to the Engineering Manager and liaises with their respective Area Managers. They are responsible for coordinating the performance of engineering work within their areas of responsibility, including:

- between the different engineering disciplines;
- with other areas at the battery limits of their areas; and
- with other project disciplines (procurement and construction).

In addition the Lead Discipline Engineer will:

- ensure the engineering documentation is complete for the area;
- define the engineering deliverables;
- plan the work for their areas to meet the overall schedule;
- ensure that engineering documentation is coordinated, issued on time, and covers all the physical scope to be purchased, installed and commissioned;
- ensure the man hour budget includes all the activities and deliverables to meet the technical scope of work according to SLI work processes and procedures including:
  - audits,
  - quality and checking activities,

- discipline interfaces and coordination,
- design reviews, including Hazops, Chazops, H&S, operation and maintainability,
- site visits,
- Vendor documentation review,
- final documentation review and handover, and
- project engineering closeout.

12.2.3.3 Package Engineers

Package Engineers are under the direction of the Area Managers and are responsible for the preparation of the engineering work packages within their areas. Key responsibilities of the Package Engineer are:

- prepare and assemble all technical documents for their assigned packages in a timely manner;
- ensure that all documents are compatible with each other and that there are no gaps in the defined scope of work;
- organize and chair the kick off meeting to start work on the package;
- integrate standards specifications, environmental, ergonomic, health and safety and quality requirements into the scope of work of his packages;
- ensure that technical documents are coordinated and checked prior to the documents being put into the “Pink Room” (Virtual Pink Room);
- ensure that all non discipline documents pertaining to a package are compiled and the necessary signatures obtained;
- draw up the requests for tender, for addenda, for award, for construction and obtains the necessary signatures and presents the complete package of engineering documents to the Area Manager;
- collaborate with procurement in the preparation of the bid, Vendors bid list, bid analysis and Vendor selection;
- coordinate technical input at tender clarification and contract award meetings;
- coordinate technical evaluations of tenders across the required disciplines including H&S; and
- coordinate the review of Vendor documents.

12.3 PROCEDURES

Procedures are provided for all key elements of the engineering work. The procedures cover various aspects of engineering from planning, checking, and change control to engineering quality assurance and control.

The procedures are issued and controlled by the Engineering Manager. Procedures are reviewed with Nalcor to include their requirements. The key procedures are as listed in the following table:

Table 12-1: Typical Key Engineering Procedures and Work Processes

Document	Title
4002-MMG-E	Description of Major Documents Produced by Engineering
4003-MMG-E	Laws and Ethics
4004-MMG-E	Engineering Organization
4005-MMG-E	Master Scope Document
4012-MMG-E	Discipline Design Criteria
4013-MMG-E	Design Brief and Calculations
4014-MMG-E	Technical Specifications EG, ES, EF and Scope of Work Specification EW
4015-MMG-E	Engineering Drawings
4030-MMG-E	Engineering Technical Audits
4031-MMG-E	Design Reviews, Verification and Validation
4032-MMG-E	Design Change Control
4033-MMG-E	Review of Vendor Documents
4034-MMG-E	HAZOP Review
4035-MMG-E	Design Interface and Coordination
4036-MMG-E	Project Team Interface
4042-MMG-E	Control of External Standards, Codes, Local Laws and Regulations
4057-MMG-E	3D Design (Model) Reviews, Verification, and Validation
P-40-01-MMG-E	Engineering Management
P-40-04-MMG-E	Manpower Forecasting and Levelling (MFL)
P-40-07-MMG-E	VDRL (EW Appendix C) – Preparation and Review
P-40-08-MMG-E	Design Change Notice (DCN)
P-40-09-MMG-E	Technical Report
P-40-12-MMG-E	Interdisciplinary Coordination IDC
P-40-13-MMG-E	Engineering Construction Support
P-40-14-MMG-E	Construction or Installation
P-40-15-MMG-E	Master Scope Document
P-40-18-MMG-E	Supply EW Scope of Work (Purchase Order)

12.3.1 Accessibility of the Documentation

The applicable procedures and instructions are readily available in the SLI Corporate web site.

12.3.2 Training

The engineers and designers comprising the team will be trained in these procedures to ensure:

- uniformity of the work methods;
- the application of quality control points;
- the alignment of every team member with the normal and logical relationships between engineering disciplines and with other functional services executing the project; and
- the Engineering Coordinator will have the responsibility to organize the training.

12.4 RESOURCES

Engineering will mobilize people as per the project MFL plan. The Engineering Manager will approve the staffing plan and the engineering budget.

The project home office will work a 40-hour week with a 50-hour week available for individuals on assignment from another office. All overtime work require the prior approval of the Project Engineering Manager as well as the Nalcor Project Manager.

Staffing of the engineering resources is the responsibility of the lead Discipline Engineers and is done in close collaboration with the project HR department.

12.4.1 Local Resources

All local resources in the engineering office will be acquired from the existing pool of resources of SLI. Gaps in resources will be filled by hiring from other SLI offices and local hiring.

The project HR Manager assures staffing candidates are recruited in a timely fashion in accordance with the staffing plan. They will coordinate weekly on staffing matters with the discipline Managers.

12.4.2 External Resources

Resources, which may not normally be part of SLI staff, will be hired specifically for the project and form part of the engineering core team.

12.4.3 Specialized Engineering

Specialized engineering resources, which are not available locally, will be hired specifically for the project and may work from their office location when approved by Nalcor on a case by case basis.

12.4.4 Engineering Sub-contracting

Specific engineering design work will be sub-contracted to specialist firms, such as for hydraulic modelling.

12.5 ENGINEERING PACKAGES

SLI engineering deliverables are grouped into packages that are aligned with the commitment packages.

Specific engineering packages have been established by each area to match the contracting and purchasing package needs. A number of engineering packages will be multi disciplinary, in particular those for general purpose buildings and some Mechanical Electrical Instrumentation (MEI) contracts. A package engineer is assigned to each engineering package to assume the overall interdisciplinary coordination and accountability for the timely completion.

12.6 ENGINEERING ACTIVITIES PLANNING AND CONTROL

The key tools used for planning and control of engineering activities are:

- Engineering deliverables and activities list in PM+ internal mandate
- Project document management system SPF
- Engineering schedule
- CPN Package list in PM+

12.6.1 List of Deliverables

The list of deliverables includes the documents required for the plant construction, commissioning, operation and maintenance.

All deliverables and activities will be listed in PM+ Internal Mandate module and include:

- planned, actual, forecast start and finish dates;
- issues and revisions; and

- PDF copies of the documents in SPF.
- Such documents comprise, but are not limited to:
- Technical documentation
- Design criteria
- PFDs
- P&IDs
- Standards specifications
- Equipment specifications
- Equipment data sheets
- 2D drawings, including plot plans, layouts, general arrangements
- 3D models for certain areas to facilitate detailed H&S review with Nalcor
- Purchase requisitions
- Contractual requisitions
- Mechanical, piping, electrical and control lists including cables, piping, instruments, motors and IOs (generated as reports from database)
- Line diagrams including piping, electrical and instrumentation (generated as reports from databases)
- Material take offs for procurement, cost estimating and trending purposes

12.6.2 List of Activities

Activities are elements of SLI engineering scope not related to a specific plant facility or process deliverable document; but which are required for the overall completion of SLI engineering mandate.

Activities include:

- Engineering reviews
- Progress reviews (weekly, monthly)
- Bid reviews and recommendations
- Support for construction queries and clarifications
- Support for commissioning preparation and later queries

12.6.3 Planning

The engineering, procurement and construction schedules are integrated at the package level. Relationships are developed in Primavera based on the package award dates and the required issue dates for construction. Every engineering

deliverable and task has a schedule, forecast and actual date, based on the Primavera schedule.

The deliverable status (forecast completion dates) will be reviewed regularly. The progress reports are extracted out of PM+ to determine engineering progress in terms of scheduled delivery of design documents. Look-ahead reports are used for short term planning.

12.6.4 Progress Measurement and Man hour Control

Engineering progress is measured on an earned value basis. Budgeted hours are assigned to each deliverable and activity in the smallest units of breakdown and grouped under a cost code structure allowing area and discipline totals to be produced.

PM+ produces a weighted progress achievement by comparing remaining durations to the baseline plan durations. The man hour expenditure is reported on time sheets according to the cost code breakdown of engineering. Spent hours and earned values are compared using a separate calculation sheet to produce progress curves and performance charts. Area Managers monitor the performance of their groups and apply corrective action where needed.

12.7 PROJECT CHANGE MANAGEMENT

Engineering flags all changes to scope from the agreed scope definition as registered in the Master Scope Document. Engineering also flags all changes to the project design criteria that may impact its work or project cost and schedule.

Engineering changes are processed through the change management procedure, as defined in the project procedures, ensuring the interface with other functional disciplines for a complete evaluation of the change consequences (including H&S, Environment, and Quality impacts) and, if approved, for the proper adjustments to the project scope, cost and schedule.

The Change Control Coordinator interfaces with the cost control group to ensure that changes are appropriately captured and timely resolution is made. The schedule/trend engineer is also responsible for coordinating the input to Project Control on PM+ engineering progress. The schedule/trend engineer is the Engineering Department's single point of contact for both of these activities.

12.8 ENGINEERING DESIGN AND DESIGN SYSTEM

Engineering proceeds with designs generally in accordance with the following hierarchy of documentation:

- Basic engineering design data established from owner supplied technology packages
- Owner supplied design philosophies and design criteria
- Master Scope Document
- Project design criteria
- Standards specifications
- Equipment specifications, data sheets and drawings

Trends and changes are defined in accordance with and based on the above.

The deliverable format, border files and title/signature blocks are project standard.

The lead discipline engineers will review and approve all engineering software and tools to be used on the Project.

12.9 ENGINEERING DISCIPLINE SPECIFICS

The primary responsibilities and activities of each of SLI disciplines are related to all aspects of the engineering design, selecting, specifying, and requisitioning to satisfy Project requirements. The discipline works closely with other engineering disciplines and functional groups (such as project controls, procurement, construction, regulatory or governing authorities and Nalcor) to provide consulting and advisory assistance on all matters related to deliverables.

12.9.1 Hydraulics Hydrology

The following activities and deliverables will be the responsibility of the hydraulic and hydrology group:

- Prepare hydrology data for the project
- Supervise ice monitoring program and update report
- Prepare the hydraulic design criteria
- Hydraulic analysis of Spillway and Intake
- Supervision of physical hydraulic model construction and testing
- Input into the overall layout of the main structures, cofferdams, dams, spillways, intake etc.

- Input in environmental mitigation measures to be integrated in the relevant civil contracts
- Input in the permit application

12.9.2 Civil, Concrete and Structural

Activities and deliverables generally include the following:

- Preparation of civil, concrete and structural design criteria and design briefs
- Preparation of project specifications
- Design equipment and building foundations and structures
- Preparation of engineering drawings
- Design of services structures, such as pipe racks
- Design of civil infrastructure – grading, drainage, site preparation, roads and paving
- Input to construction and installation contracts
- Technical support for procurement, estimation and construction
- MTOs for cost estimation and requisition tables
- Material requisitions
- Technical bid evaluations and recommendations
- Coordination, meetings and correspondence with Vendors
- Review of Vendor documentation, drawings and data
- Compliance with industry codes and standards
- Enforcing the requirements of Newfoundland and Labrador regulatory agencies

12.9.3 Geotechnical

The following activities and deliverables will be the responsibility of the Geotechnical and Geology group:

- Preparation of geotechnical and geological design criteria and design briefs
- Preparation of project specifications
- Design rock excavation and rock excavation reinforcement for all structures
- Design foundations treatment for all structures
- Preparation of engineering drawings all structures foundation
- Preparation of engineering drawings for cofferdams
- Preparation of engineering drawings for the North Spur
- Participate in the design of civil infrastructure – grading, drainage, site preparation, roads and paving

- Input to construction contracts
- Technical support for procurement, estimation and construction
- MTOs for cost estimation and requisition tables
- Technical bid evaluations and recommendations
- Participate in the review of Vendor documentation, drawings and data
- Compliance with industry codes and standards
- Enforcing the requirements of Newfoundland and Labrador regulatory agencies

12.9.4 Architectural and Landscaping

The following activities and deliverables will be the responsibility of the architecture and landscaper groups:

- Preparation of architectural design criteria and design briefs
- Preparation of project architectural specifications
- Architectural design of buildings per facility
- Preparation of architectural drawings
- Input to sustainable development design
- Input to overall general layout of the facility
- Input to construction and installation contracts
- Technical support for procurements, estimation and construction
- MTOs for cost estimation and requisition tables
- Material requisitions
- Technical bid evaluations and recommendations
- Coordination, meetings and correspondence with Vendors
- Review of Vendor documentation, drawings and data
- Compliance with the industry codes and standards
- Enforcing requirements of the Newfoundland and Labrador regulatory agencies

12.9.5 Mechanical and Piping

Activities and deliverables generally include the following:

- Preparation of design criteria, basis, briefs and calculations
- Preparation, updating and/or validation of process flow diagrams and P&ID's
- Heat and material balances, equipment lists, tie in lists, battery limit lists
- Plot plan development
- Equipment layouts

- Flow sheets and P&IDs completion
- Piping arrangement drawings
- Line lists, valve lists
- Environmental engineering, including H&S risk register management
- Equipment selection and sizing
- Preparation of discipline design criteria and design briefs
- Activities related to equipment design, optimization, selection and sizing
- Design calculations
- Application and incorporation of industry codes and standards
- Interpretation and implementation of regulatory agency requirements, including EIA report
- Preparation of equipment specifications, data sheets, drawings, sketches or details
- Preparation of equipment lists and similar equipment spreadsheets
- Preparation of MTOs
- Equipment and material requisitions
- Technical bid evaluations and recommendations
- Coordination, meetings and correspondence with Vendors
- Review of Vendor documentation, drawings and data
- Assistance in preparation of final project mechanical catalogues and data books
- Project specific studies, reports or technical or cost analyses related to mechanical equipment or related system feasibility, suitability, optimization

12.9.6 Electrical

Activities and deliverables generally include the following:

- Preparation of design criteria and design briefs: for the design guidelines and operating requirements of the electrical systems, including the protection and emergency shutdown philosophies
- Main and secondary single line diagrams
- System and design calculations
- Equipment and substation layout drawings
- Details drawings

- Cable lists
- Standard installation details
- General and specific equipment specifications
- Electrical consumers list
- Technical support for procurement, estimation and construction groups
- MTOs for cost estimation and requisition tables
- Equipment and material requisitions
- Technical bid evaluations and recommendations
- Coordination, meetings and correspondence with Vendors
- Review of Vendor documentation, drawings and data
- Compliance with the industry codes and standards
- Enforcing requirements of the Newfoundland and Labrador regulatory agencies
- Add HVdc specialties

12.9.7 Telecoms

Activities and deliverables generally include the following:

- Preparation of design criteria and design brief, general specification of the system and services.
- Support others disciplines in all matters concerning telecommunication infrastructure, equipments and system, i.e., support of the communication required by electrical sites, protection and control functions, power plant, spillway.
- Definition of the services and system required during the construction phase
- Design of the telecommunication network for the permanent electrical infrastructure
- Preparation of equipments, services and system specifications, data sheets, drawings, sketches
- System and design calculation
- Sizing and selection calculations
- MTOs for cost estimation and requisition tables
- Identify, incorporate and apply industry national and international codes and standards
- Technical support for procurement, estimation and construction groups
- Coordination, meetings and correspondence with vendors
- Review of Vendor documentation, drawings and data
- Technical bid evaluation and recommendations

- Factory acceptance test witnessing of telecommunication equipments

12.9.8 Instrumentation and Control

Activities and deliverables generally include the following:

- preparation of I&C discipline design criteria, general specification, drawings template and design briefs;
- preparation of instrumentation and equipment specifications, data sheets, hook up drawings, sketches or details;
- support other disciplines in all matters concerning instrumentation and controls, e.g., development of I&C general and specific requirements for mechanical equipment and/or packages, design criteria for control rooms, design instructions for the installation of instruments, etc.;
- application and incorporation of industry codes and standards;
- technical bid evaluations and recommendations;
- conceptual engineering and detail design of all I&C systems for the project not included in an equipment or package;
- development of those P&IDs that are not included in an equipment or other package;
- specification of the instrumentation and control requirements for mechanical equipment or packages;
- sizing and selection calculations;
- initial set up and entering of the instrument and control data of the Instrument Index;
- review of Vendor documentation, drawings and data;
- factory acceptance tests witnessing of special equipment;
- preparation of all I&C installation drawings not included in a supplies package, such as:
  - interconnection block and wiring diagrams,
  - motor schematic and wiring diagrams,
  - panel (control, PLC, relay) layouts, schematic and wiring drawings,
  - instrument location and cable routing drawings,
  - instrument power supply and distribution drawings,
  - instrument installation details and bill of materials, and
  - cable schedules;

- continuous updating of the Instrument Index with the drawing data;
- preparation and issue of design instructions; and
- preparation and continuous update of the Drawing Index.

12.9.9 Automation

Activities and deliverables generally include the following:

- preparation of programming specifications and methodology;
- validation of standards and methodology in a vertically integrated bench test facility;
- support other disciplines in all matters concerning L1 and L2 control systems;
- application and incorporation of industry codes and standards;
- technical bid evaluations and recommendations;
- functional description for each application;
- programming and simulation of each application program; and
- pre-commissioning of each application program on site.

12.9.10 Transmission Line

Activities and deliverables generally include the following**:**

- Preparation of design criteria and design briefs for the design of transmission line routing, transmission line design, foundation design and tower design
- Route selection drawings
- RoW clearing and preparation specifications and drawings
- Foundation specifications and drawings
- Tower specification and drawings
- Hardware, accessories and fittings specifications and drawings
- Construction and material specifications
- Structure lists
- Staking tables
- Material take-off lists
- Plan and profile drawings
- Engineering reports
- Soil investigation reports
- RFI and RFP package preparation
- Technical bid evaluations and recommendations

- Technical support for procurement, estimation and construction groups
- Review of vendor documentation, drawings and data
- Internal coordination meetings
- Review and verification of company supplied data
- Preparation of engineering drawings for permit support
- Completion report
- As-built drawings and documentation

12.9.11 Engineering Meetings

Engineering meetings are held on a weekly basis by each Area Manager to review progress of deliverables/packages, address critical issues, do a one week look-ahead and coordinate work between all disciplines within their area and other functions/areas of the project.

The Engineering Manager will hold a general engineering meeting every week with lead discipline engineers to address general project and engineering issues.

Separate coordination and critical issue meetings are held on an as required basis by the area, package and discipline engineers.

12.9.12 Inter-disciplinary Coordination

Inter-disciplinary coordination is managed through the following activities:

- Weekly discipline meetings led by the lead discipline engineers for the discipline
- Weekly area meetings led by the Area Manager
- Weekly engineering meeting led by the Engineering Manager
- Planned, (PM+ tracked), inter discipline review of documents

12.9.13 Environmental Requirements

Environmental compliance requirements are described in the Regulatory Compliance Plan as updated in the previous phase identifying the responsibility of each functional discipline including Engineering. The environmental engineer reviews all engineering documentation to ensure compliance.

12.9.14 Permitting Requirements

Engineering provides the necessary engineering data, drawings and calculations to support Project's permitting process. SLI will establish a list of permits required.

Engineering deliverables associated with the permits are identified and planned accordingly. Engineering and Nalcor will regularly monitor the plan.

Engineering will provide Nalcor with the necessary documents to meet insurance requirements for each completed facility, based on fire prevention and protection design criteria and specifications approved by Nalcor and its insurer.

12.10 ENGINEERING DESIGN REVIEWS

The basic objective of the design review is to demonstrate that a design satisfies the functional requirements of the project, to identify areas of inadequacy where additional engineering effort is required and to provide proper documentation in order that any necessary corrective action can be initiated by the project management.

12.10.1 Maintainability and Operability Review

Scheduled General Arrangement Drawing Reviews will be conducted with Nalcor Operation Team to review the facility details in terms of maintainability and operability. In addition, all specifications will be reviewed by Nalcor Operation Team.

12.10.2 Peer Reviews

Besides normal project checks and reviews, engineering will have technical reviews by external engineering functional management and expert personnel. A minimum set of engineering documents/designs, selected due to their risk and critical design rating, for off-project reviews have been identified and scheduled for reviews.

12.10.3 Risk Analysis

Risk analyses are conducted in accordance with the Risk Management plan. Mitigation plans will be developed whenever risks are identified.

12.11 H&S DESIGN REVIEWS

Three specific design types of safety reviews will be conducted, namely: H&S, Hazard and Operability studies (HAZOP).

12.11.1 H&S Reviews

Engineering will incorporate in its design the requirements of Nalcor's H&S standards as applicable.

Identification, evaluation and recording of risks will take place strategically through the design, construction and start-up stages of the project. This will include, during the conceptual design phase of the project, a preliminary H&S analysis to identify H & S issues or major hazards using SLI's H&S methodology. Risks are registered in a risk register and mitigations are developed.

This analysis will focus on general arrangements and flow sheets. These reviews are integrated to the normal design process and performed at the appropriate stage of the basic or detailed engineering. The reviews are done by area as soon the plant layout is well established.

The objective is to identify H&S and code compliance concerns with layouts and develop mitigation measures to be implemented by the design team.

12.11.2 HAZOP Reviews

Where required, HAZOP studies are performed with a focus on the identification of any remaining hazards and the impact on the safe operation of the system and the environment. These will mainly consist of a systematic review of the single line diagrams, area plans, plot plans, building/structure plans, and their systems and subsystems, item by item, line by line, using key words and recognized procedures. The reviews will be conducted by qualified personnel.

12.12 CONSTRUCTABILITY REVIEWS

Constructability reviews will be part of the design work process. Engineering and construction personnel will identify deliverables for constructability reviews before those deliverables are issued for construction.

Construction will conduct the review sessions and record the observations and comments of the review team. Each review comment will be resolved by engineering and the actions taken will be recorded. The constructability reviews will focus on analyzing designs to improve construction safety, reduce costs, complexity and schedule.

12.13 ENGINEERING REQUISITIONS FOR PURCHASE ORDER OR CONTRACT

Engineering is responsible for the preparation of the requisitions, which form the scope of contracts and purchase orders. The basic scope for the different contracts and purchase orders is defined by the package dictionary.

The requisitions and purchase orders basically contain the following elements:

- scope of work describing inclusions, exclusions, battery limits, technical assistance requirements and any optional items;
- specifications and data sheets describing the technical requirements of the work to be provided;
- H&S requirements and specifications;
- Environmental requirements and specifications;
- document listing providing a list of all documents that form the basis of the contract or purchase order;
- document submittal listing providing a definition of all documents to be submitted by the Vendor or Contractor, with required submittal dates, that are to be reviewed by SLI.

13 CONTRACTING, PROCUREMENT AND MATERIAL CONTROL

13.1 INTRODUCTION

This section describes the strategy and guidelines applicable to the formation, execution and management of contracts, purchasing, material control, expediting, inspection and logistics activities for the Project. Procurement personnel must at all time conduct themselves in a manner that is ethical and promotes the best interests of Nalcor and the Project.

13.2 PROCUREMENT STRATEGY

It is the Project Procurement Manager's responsibility to ensure the smooth operation of all procurement related activities, in all countries, until acceptance of goods at the site. Project Procurement services shall provide the necessary resources for adequate planning and monitoring support for the following activities:

- Management (including ethical conduct measures)
- Contract Formation and Administration
- Purchasing
- Expediting
- Quality Control and Inspection
- Logistics/Traffic
- Material Control

The procurement strategy is to purchase the necessary materials, equipment and services for the project using a variety of contracting approaches through a competitive bidding process.

The work has been packaged into approximately 113 work packages, which will be reviewed and finalized through the package scope dictionaries. The package dictionaries summarize the scope of work, define the interfaces and cross reference the relevant items in the equipment list, see LCP Master Package Dictionary 505573-0000-39RA-I-0006.

In general, it is expected that competitive bids will be obtained from a minimum of three qualified bidders. However, under specific circumstances Nalcor may approve for specific packages when only one or two bidders have been identified. Some

specific packages have been identified by Nalcor as being obtained from Innu registered Companies.

Reasons for considering single source or limited bidders are:

- Mandatory Vendor for technology purposes.
- Vendor where Nalcor has already negotiated a Global Framework Supply Agreement (nominated Vendors) which could be leverage for project requirements.
- Vendor where SLI and Nalcor have negotiated part of the previous Study Global Framework Supply Agreement (nominated Vendors) which could be leverage for project requirements.
- Limited or only known source for the equipment or service.
- Goods produced and sold by only one company that has the exclusive right to manufacture and sell (Patent).
- Requirements of the project with regards to uniformity, or compatibility of other existing equipment of the plant (including the maintenance and the management of the spare parts).

In order to leverage the best supply capabilities available on the market, we recommend using five types of package, which are defined as follows:

Supply purchase orders

Lump Sum contracts

Supply and Installation Contracts

Unit Price Contracts

Service contracts

13.2.1 Sources of Supply

A complete review will be performed of the Vendor database for other similar work undertaken within the Global SLI Network to identify potential vendors for pre-qualification using Nalcor's pre-qualification process.

Local sources of supply will be invited to participate in the proposal process wherever it is practical and economically reasonable to do so in accordance with the Lower Churchill Benefits Agreement. As such, Newfoundland and Labrador is a primary and required strategic source of equipment, materials and services to ensure the ongoing support for the Project by local Vendors and Contractors.

Inclusion of Low Cost Country (LCC) sourcing of equipment and materials from China, India, and other low cost countries is an integral part of the sourcing strategy on the project, especially considering the current cost of commodities and the shortage of supply of certain materials within the country. Special focus on qualification through detailed shop surveys and Vendor appraisals of suppliers with Hydro and Transmission industry experience will be performed to fully assess the level of sourcing risk.

In each instance qualification of the facilities and evaluation of the commercial and technical capabilities of the parties to execute the work will be conducted. Shop loading shall be evaluated in conjunction with market trends, and a costing analysis of the net potential return after transportation, installation and project management costs will also be performed.

13.2.2 Purchasing Strategy

Request for Proposals (RFP) documentation, purchase orders and contracts for equipment and materials shall be developed in accordance with Nalcor's contractual requirements.

Major material supply and equipment packages will be issued for competitive international proposals. Qualified sources of supply will be recommended for inclusion and approval as bidders. Commercial conditions for international and local bidding are based on the laws of the Newfoundland and Labrador.

The prequalification of suppliers will include, but not be limited to, the following:

- The existence, in their shop, of all tools and equipment needed to undertake and complete the work.
- Demonstrate successful experience in the construction of similar Work.
- Material Control procedures.
- A Quality Assurance and Quality Control organization in conformance with the standards required by the Project.
- Experience using the codes and standards required by the Project.
- The necessary experience in supplying in international markets with the emphasis on packing for sea transport, custom document preparation, etc.
- Relevant Safety (HSE) records.

Actions will be taken to secure materials and items of equipment with long lead delivery times. Due to market conditions, the following are some of the key packages identified for early commitment:

- Turbine and generator
- Transformers
- Switchgear
- Transmission Tower Steel
- Transmission Lines
- Gates
- Converters

13.2.3 Packages – Supply and deliver of materials

The supply of materials are being used for the sourcing of specific equipment from the recognized Original Equipment Manufacturer (OEM) and fabricators for which SLI develops the detailed engineering requirements and support all material management responsibilities. During the execution of the construction contracts, the equipment and material are free-issued to the Contractors for installation. Specific general terms and conditions are developed to guarantee supply and equipment performance, including appropriate delivery commitment guarantees.

13.2.4 Lump Sum Contracting Strategy

Lump Sum packages are being used for packages where the design-build-install-commission-start-up responsibility will be undertaken by the Contractor. Appropriate Performance tests and schedule guarantees are included in the works. All lump sum contracts are subject to the same on-site terms and conditions as are applicable for construction contracts.

Other packages have been identified as lump sum contracts and will be contracted and awarded on a competitive basis in accordance with project requirements.

13.2.5 Construction Contracting Strategy

Construction packages are being used for areas of work where the design responsibility will be undertaken by SLI and the Contractor will execute all works as detailed in the specific scope of work.

Construction contracts will be placed on a lump sum, unit rate or re-measurable basis. Appropriate process and schedule guarantees may be included in the

contracts. All Construction contracts are subject to the same on-site terms and conditions as applicable for Turnkey/Site Services.

Services and unit rate contracts will be placed on lump sum unit rate or re-measurable basis. Appropriate process and schedule guarantees may be included in the contracts. All Services contracts are subject to the same on-site terms and conditions as applicable for construction contracts.

13.3 SCOPE

The scope of procurement is to execute all procurement and materials management related functions. Procurement will support Nalcor in all aspects of the Project which pertain to the supply of goods, services and systems, IBA contracts for the contractual administration of all orders and contracts, and for maintaining complete records on all contractual issues pertaining to such orders and contracts.

13.4 ORGANIZATION

The Project Procurement Manager reports directly to the Project Manager and is responsible for all project contracting and materials management functions. The Procurement Organization is shown in APPENDIX C, Chart 3.

13.5 RESPONSIBILITIES

SLI's procurement policy is to promote the best interests of Nalcor through intelligent action and fair practice to obtain the maximum value through competitive bidding and negotiation, in accordance with the following principals:

- Procurement is responsible for the identification and qualification of all bidders.
- All requests issued for pricing are to be in accordance with the client's requirements.
- All price negotiations, Purchase Order (PO) and contract commitments are made by a representative of SLI procurement after client approval.
- A Vendor will not be asked to submit a proposal for materials, Equipment or services if they are not to be given due consideration in selection and award of a PO, or if another source of supply has already been selected.
- All bidders will be qualified before being placed on the bid list in accordance with the client's requirements.

- All discussions with Vendors are arranged by Procurement.
- No indication of product preference, sources of supply and no information regarding competitive position, final approval or price are to be provided to any Vendor.
- All correspondence with Vendors is conducted by or over the signature of a procurement representative.
- Monitoring of Vendors progress performance, progress billing, shop expediting and material control are the responsibility of Procurement.
- Procurement is responsible for any arrangements pertaining to the transport and monitoring of equipment and material deliveries, including customs clearance.
- Site warehousing and inventory control, reporting to the Construction Manager, is under the functional responsibility of Procurement.
- All procurement activities are planned, monitored and reported through the PM+ project management system. During the commercial evaluation process the Buyer will be responsible for the issue and receipt of all technical and commercial proposal clarification correspondence and will attend all Proposal Clarification Meetings with Engineering and other Project disciplines in attendance.
- After the Recommendation for Award has been approved by SLI and Nalcor, the Buyer will compile the Purchase Order and issue it for Nalcor's signature execution.

13.6 PURCHASING

The Buyer shall report, to the Project Purchasing Manager who is responsible for ensuring that all major international Purchase Orders are completed in accordance with the contractual terms.

The Buyer will be responsible for the commercial evaluation of Purchase Orders and will coordinate with Engineering to make a Recommendation for Award which will be submitted to the Purchasing Manager and Project Procurement Manager for review and acceptance. The Recommendation for Award will be issued along with the Commercial Bid Tabulation compiled by the Buyer and the Technical Evaluation Bid Tabulation compiled by the Package Engineer.

During the commercial evaluation process the Buyer will be responsible for the issue and receipt of all technical and commercial proposal clarification correspondence and will attend all Proposal Clarification Meetings with Engineering and other Project disciplines in attendance.

After the Recommendation for Award has been approved by SLI and Nalcor, the Buyer will compile the Purchase Order and issue it for Nalcor's signature execution.

13.7 CONTRACT ADMINISTRATION

The Contract Administrator shall report, to the Project Contracts Manager who is responsible for ensuring that all major international contracts are completed in accordance with the contractual terms.

The Contract Administrator will be responsible for the commercial evaluation of Turnkey Contracts and Construction Contracts and will coordinate with Engineering to make a Recommendation for Award which will be submitted to the Project Contracts Manager and Project Procurement Manager for review and acceptance. The Recommendation for Award will be issued along with the Commercial Bid Tabulation compiled by the Contract Administrator and the Technical Evaluation Bid Tabulation compiled by the Package Engineer.

During the commercial evaluation process the Contract Administrator will be responsible for the issue and receipt of all technical and commercial proposal clarification correspondence and will attend all Proposal Clarification Meetings with Engineering and other Project disciplines in attendance.

After the Recommendation for Award has been approved by SLI and Nalcor, the Contract Administrator will compile the Contract Document in duplicate and issue it for Nalcor signature execution.

13.8 SITE CONTRACT ADMINISTRATION

After Contract Execution, the Site Contract Administrator will be responsible for post contact administration including but not limited to processing of Progress Billing Payments.

The Contract Administrator is also responsible for supervising, coordinating and preparing reports on all major contract activities, from equipment identification by Engineering and Procurement activities, to receipt at site.

This group is responsible for administering construction and installation contracts for the supply of goods and services by local or international companies. This implies monitoring Contractor compliance with schedules and the contractually agreed upon budget in the production of plans, documents, production, delivery, installation and inspection by the Sub-contractors.

Site Contract Administrators will be assigned to the Construction Group to monitor and administer the construction contracts. Site Contracts Manager reporting operationally to the Construction Manager and functionally to the Procurement Manager will be responsible for the site Contract Administrators.

This group shall be the official link between Contractors working at the site and the various project crews. All communications between Contractors and the project will be handled by this group so that the group has an accurate picture of the status of technical, administrative and commercial matters. The follow-up system for Contract management is PM+.

More specifically, the group will be responsible for:

- Reviewing technical issues, Requests for Concession, Drawing Change Notices, Site Instructions and nonconformities with regard to their impact on costs for the various contracts.
- Managing (weekly) site meetings with each Contractor including writing the minutes of the meeting and follow-up.
- Administration of pro rata payments for work completed, change orders, changes and contract closeout.
- Assisting the Area Construction Manager in day-to-day contract administration.

13.9 MATERIALS MANAGEMENT

The field Materials Co-ordinator will be responsible for Materials Management and for ensuring that all identified material and equipment is transported and received in accordance with the schedule established for these activities. Materials Management will also be responsible for monitoring, coordinating and reporting on all material related activities highlighting undesirable trends and initiating corrective action through the responsible discipline heads or project management.

Materials Management crosses the disciplines of engineering, procurement with each of the disciplines assuming their own material control responsibilities. All three

disciplines will coordinate their activity accordingly. Procurement will provide material control personnel for the procurement and construction activities.

The field Material Coordinator ensures that purchased products are delivered to the Construction Site or Marshling yards in good condition and on schedule.

The Materials Coordinator, stores, accepts, inspects and stocks purchased materials and equipment and makes the materials and equipment available for permanent installation but also for all the working equipment, including the spare parts. The Material Control management and follow-up system is PM+.

The PM+ project management system will be used to assist in materials management functions and reporting. It is the responsibility of Material Manager to ensure that the PM+ system is maintained for all materials and equipment purchased, in fabrication, in transit and in inventory.

13.10 EXPEDITING

The Expediting Manager is based in the project office and manages the project expediting coordinating with all parties on any significant supplier scheduling or contractual deliverables deviation and will initiate corrective action as required along with materials co-ordination. All expediting activities shall be the responsibility of the Expediting Manager who shall take charge of all expediting cycle activities, beginning with the definition of specific expediting needs and supervision of engineering and manufacturing activities until delivery on site.

SLI uses affiliate offices to conduct shop expediting activities and third party agencies when it is cost effective. Regular expediting coordination meetings will be scheduled. SLI expediting will arrange expediting assignments as required taking into account the supplier's capability, the equipment or material supplied, the expeditors' experience and general cost efficiency. The continuity of expeditors on the respective assignments will be maintained as much as possible.

The Expediting Manager is responsible for having the Expeditors carry out the monitoring activities in close cooperation with the Inspection Manager and Project Buyers.

13.10.1 Methodology

The Expediting Manager shall be kept well informed of all expediting activities through Project schedule updates.

The Expediting Manager shall open an expediting file for all RFPs; the file shall bear the same number as the RFP.

The Expediting Manager shall attend pre-commitment meetings with Vendors to review expediting needs with an emphasis on the following items:

- Project Expediting Procedure
- Preparation of the supply-related schedule
- Progress reporting
- Format and frequency
- Drawings/documents to be submitted
- Approval procedure
- Lines of communication
- Copies of Sub-vendor purchase orders
- Vendor expediting program

For each purchase order the Expediting Manager shall, with the approval of the Project Procurement Manager, define an expediting level and program that is appropriate to each Vendor and SLI's past experience with that Vendor, the on-site need for the equipment in question, the dimensions and complexity of the equipment, the number of Sub-vendors, and the urgency of delivery.

The Expediting Manager shall inform the Expeditor of the nature and frequency of the contacts with the Vendor (i.e., the expediting level) and the contractual schedule, and shall determine the expediting budget. The Expeditor shall then initiate the expediting activities by requesting the following items from the Vendor:

- List of drawings/documents to be submitted by the Vendor and his Sub-vendors.
- A program and detailed schedule of engineering, material procurement and manufacturing activities.
- The inspection test program in accordance with the monitoring plan established by the Project based on the Vendor's inspection and testing plans.
- List of equipment, Sub-vendors and purchase orders.
- The PM+ Expediting module shall be kept up to date at all times.

Whenever an Inspector visits a factory and discovers a change in the schedule or issues a specification non-conformance report, the inspector shall promptly notify the Expediting Manager. The Expeditor shall similarly inform the Inspection Manager of any slippages that could affect inspection requirements.

As soon as a delay is discovered, the Expeditor shall take the necessary measures, with the approval of the Manager, to correct the situation.

13.11 INSPECTION

Quality Control in manufacturing plants is necessary to ensure the required contractual conformance of all materials and equipment purchased or manufactured by Vendors and Sub-vendors. The purpose of this function is to assign responsibilities and describe the activities associated with Quality Control. This applies to the Inspection Coordinator, the Factory Inspector, the Engineering Manager, the Quality Manager, and the Project Manager.

Inspection may participate in the bid qualification and evaluation process to validate proposals' compliance to quality standards. ISO 9001 Certification will be verified and, in the absence of certified qualifications, the Inspection Coordinator will ensure that suppliers' programs are submitted and verified to be in accordance with the recognized standards.

13.11.1 Pre-inspection Activities

For each item of materials and equipment, Engineering and the Project QA/QC Manager shall jointly define the inspection level on the work package deemed necessary for effective conformance control. The Project inspection plan is based on the packages listed in the CPN and outlines the inspection levels of purchased materials or contracts source quality surveillance and inspection. Regular reviews of the inspection levels and plan will take place throughout the project procurement activities progress to ensure the frequency and level of supplier visits is adequate in order to fulfill the needs of the project. Upon award the supplier will be required to provide an Inspection and Test Plan (ITP) developed for the specific work. This ITP will be reviewed by SLI to ensure key inspection activities are identified; required tests have been specified and scheduled. All major equipment, critical items and bulk materials will be inspected as required by the inspection plan through visits to the suppliers' or sub-suppliers' works.

The frequency of shop visits will be sufficient to ensure that the ITP activities are adequately monitored in accordance with the established level of inspection, that test results are fully documented, verified and final verification and release of shipments are issued accordingly. Inspection visit itineraries will be produced by the shop inspectors and reviewed by the Inspection Coordinator.

PM+ will be used to record inspection activities and summarize the results of the inspection observations for applicable orders.

The QA/QC Coordinators through his Shop Inspection Coordinators shall have the following responsibilities, with the support of the Project Quality Manager:

- Coordinate activities with the Engineering Manager and responsible discipline engineers during standard specification preparation to ensure that monitoring levels are defined in relation to equipment criticality.
- Coordinate activities to ensure that all contract-specific Quality Assurance and Quality Control requirements are taken into account and activities associated with conformance dossiers.
- Qualify Inspectors based on the nature of the equipment to be monitored.
- As needed; participate in the evaluation of Suppliers and their Sub-suppliers to ensure that the latter have a Quality Program in place that is in accordance with Project needs.
- During bid analysis activities, ensure that the Suppliers and their Sub-suppliers' Quality Assurance and Quality Control documentary deliverables have been reviewed and participate in the review if appropriate.
- Receive copies of purchase orders, review them, assign an inspection level, and assign monitoring to a designated Inspector.

13.11.2 Inspection-related activities

To organize Quality Control adequately, Project QA/QC Coordinator through his Inspection Coordinator shall provide the designated Inspector with the following documentation:

- Project Inspection Procedure
- Copies of the purchase orders and amendments
- Specification
- Quality Control Plan based on the Supplier's inspection and testing plan
- Manufacturing plan

- Inspector's responsibilities
- List of drawings and all engineering documents previously listed in the PM+ system
- Sample inspection reports
- Material non-conformance report template
- Inspection and shipping release certificate
- Inspection file assignment form

The following tasks shall also be taken into account as applicable:

- Visiting factories deemed critical in person prior to the start of manufacturing to verify the Vendor's QA/QC program availability and implementation.
- Review Project and manufacturing schedules and PM+ reports with regard to monitoring activities and coordinate everything in the form of an inspection plan.
- Ensure that the designated Inspectors receive Supplier documents, procedures, manufacturing plans, monitoring plans, etc. as soon as they are reviewed by the engineers and by the Client, if contractually required.
- Ensure that the Inspectors verify that the equipment and materials have actually been manufactured according to the specifications, QA and QC programs, and that these programs have also been applied by the Sub-supplier.

13.11.3 Non-conformances and corrective actions

In the event of Quality Control-related problems (such as deviations from or non-conformances to the specifications, drawings, standards, etc.) the Inspector shall immediately notify the Inspection Coordinator who shall take the necessary corrective actions.

The Inspection Coordinator shall immediately report non-conformances to the engineer in charge and shall follow up the non-conformance until it is resolved, and shall subsequently notify all those concerned in writing. Any delays in resolving non conformances shall be brought to the attention of the Quality Manager who shall then decide on whether or not to notify Nalcor.

13.11.4 Reports

The Inspector in charge of the dossier shall prepare and issue:

- Monitoring reports on a frequency defined by the Inspection Coordinator
- Non-conformance reports

- Inspection and material shipping release certificates

The Inspection Coordinator shall be responsible for:

- Ensuring that monitoring reports clearly indicate purchase order numbers, drawings and procedures as well as revision numbers.
- Distribute the reports in accordance with the Project Distribution list.
- Ensure that manufacturing delays are reported to the Expediting Coordinator.

13.11.5 Participation in Trial Runs and Final Tests

The Quality Coordinator through his Inspection Coordinator shall be responsible for organizing and supervising the ITP approved by Engineering.

- Supplier interfaces
  - Receive trial run and testing dates from Supplier's and Expediting based on approved Vendor Inspection and Testing Programs.
  - Update the 3-month horizon inspection schedule based on information obtained from Vendors and Nalcor requirements.
  - Expedite Suppliers to obtain specific procedures for planned tests.
  - Distribute test procedures obtained.
  - Record all information with regard to individuals scheduled to witness the tests.
  - Inform Suppliers about all the individuals who will witness the tests.
- Project and Client interfaces
  - Decide which members of the Project team will witness the tests based on the revised schedule and test procedures received.
  - Notify Nalcor within the time frames defined by the Contract.
  - Send Nalcor the expediting and test procedures obtained for approval.
  - Expedite and obtain from Nalcor the names and coordinates of the delegates who will witness the tests.
  - Send Nalcor confirmation notices as defined in the Contract.
  - Expedite and obtain confirmation from Nalcor of whether or not his delegates or representatives will witness the tests.

13.12 SHIPPING/LOGISTICS

A project specific logistic plan is being delivered for the project. It is envisioned that the project will employ an offsite staging facility, plus marshalling yards along with the services of a freight forwarder.

The Logistics team on the project ensures that all materials and equipment is transported efficiently and safely to meet the project's cost and schedule objectives. Logistics retains overall responsibility for the physical movement of the equipment and materials title transfer point from the Supplier to Nalcor (except Shipment DDP) until it arrives on site.

Nalcor will be identified as the importer of record for all shipments managed by SLI. Customs' clearance of equipment and material will be undertaken by an appointed agent whose responsibility will be to ensure seamless clearance of the equipment and materials from the point of export through to delivery at site customs cleared. To facilitate customs clearance, the customs invoice, packing list and bill of lading will be requested in advance prior to arrival.

13.12.1 Marine Transport Insurance

Marine transport insurance may be contracted by Nalcor. This insurance policy will be used as coverage for all shipments being managed for the project with exception of insurance contracts where the Contractor will have responsibility for delivery to site and provides coverage of the work until delivered to the site. Notifications for insurance purposes will be carried out for each shipment.

13.13 PROCUREMENT PROCESS AND MODEL PROPOSAL AND CONTRACT DOCUMENTS

The Procurement Process comprises: development of contracting strategy; qualification of vendors; preparation and issue of bid lists; issuance of requests for proposals; management of the RFP process; evaluation, recommendation and award of project work packages in accordance with RFP procedures and Client's requirements.

13.13.1 Purchasing Plans

A purchasing plan Contracting Strategy detailing the key factors which underpin equipment or material is defined for every package. The potential list of suppliers is

included within the purchasing plan. The purchasing plans are completed progressively as part of the package kick-off process; reviewed and approved by SLI and Area Managers, and approved by the Client.

13.13.2 Qualification of Vendors and Proposal Bidders Lists

Suppliers will be pre-qualified in accordance with criteria established for the project. Bid lists will be prepared and issued to Nalcor for approval on the project in accordance with pre-qualification.

13.13.3 Request for Proposal (RFP)

Requests for Proposals will be prepared and issued in accordance with SLI procedures for this Project. All suppliers receiving Technical specifications or data will sign and return a confidentiality agreement prior to the issue of any project information to Vendors. Client confidentiality agreements are held in a separate file in alphabetical order in the Procurement file for audit purposes. Any exception by Vendors to the standard agreement must be transmitted to Nalcor for resolution.

A representative of purchasing will be responsible for each RFP issued, and will be responsible for the management of the bid process. The development and preparation of Requests for Proposals including the commercial and technical sections will be contracted with the co-operation and input from all of the related disciplines, mainly technical, quality, health, safety and environmental. All contact with the bidders will be directed through the purchasing representative. Bids will be received, registered and opened in accordance with the SLI procedures. Original copies of the bid will be retained within the procurement file and copies distributed to SLI in accordance with the Procurement Procedures for the project.

13.13.4 Bid Analysis and Recommendation

All proposals will be opened in the presence of a witness. A Nalcor representative will be invited to attend all bid openings but their attendance is not mandatory for the opening. The majority of contracts are anticipated to be lump-sum fixed price, and by exception, subject to escalation. All proposals will be evaluated to ensure conformance to technical and commercial specifications. Should it be required, a proposal clarification meeting will be held to ensure that all technical and/or commercial matters are resolved prior to the preparation of the Proposal Evaluation and Proposal Summary complete with a Recommendation for Award.

Proposal summaries will be compiled using Suppliers' quoted currencies converted to Canadian dollars using the Project's published exchange rates in accordance with SLI procedures and Client requirements. Proposals will be evaluated taking into account the evaluated price, cost of freight and insurance, compliance with purchase terms and conditions, schedule compliance, shop loading, and any options or modifications the package engineer recommends for equalization of the bids. The Package Engineer will compile a technical analysis of the quotations and submit it to purchasing to be incorporated in the recommendation.

The Recommendation for Award will be prepared by Purchasing and submitted for project approval by SLI and issued to Nalcor for approval in accordance with SLI procedures.

13.13.5 Award and Post-Award Administration

Procurement will prepare purchase orders and contracts in accordance with client requirements. Procurement will ensure that all legal documentation is in place and proceed with the distribution of the signed contract agreement. All orders will be recorded in the PM+ project management system for tracking and administrative purposes. Procurement will be responsible for the on-going administration of all purchase orders, maintaining correspondence, concession requests and change notice registers, managing variations in process and issuance of confirming change orders in accordance with the Project processes.

13.13.6 Site Contract Administration

Site Contract Administration will monitor and administer all of the day-to-day activities, scope changes; contract variations and contract closeouts to ensure compliance and consistency with the contractual obligations. They will act at all times as the contractual link between the Contractor and the Project Team. They will assist with the administration of off-site activities for Contracts and Purchase orders. All site contract administration activities will be performed in accordance with the Project procedures.

13.13.7 Kick–Off Meetings

Purchase orders, turnkey and construction contracts will be administered from site by a Contract Administrator/Buyer who will setup and facilitate package specific site kick-

off meetings to ensure compliance and understanding of contractual obligations by SLI, Nalcor and the Vendor.

13.13.8 Progress Meetings

Site Contract Administrator in conjunction with the Site Area Superintendent will chair all progress meetings, including reporting on progress measurement and any contractual matters that may arise.

13.13.9 Change Management

In conjunction with the Site Construction Group, the Contract Administrator will manage all change requests, recording the change notice and the Contractor's response as to proposed variations to scope, schedule and contract value. All change notices will be processed as part of a variation in accordance with Project procedures and will be subject to SLI's Project Manager's approval prior to Nalcor's approval.

13.13.10 Payments

Progress payments will be made in accordance with the Project procedures for Purchase Orders and Contracts. Progress payment certificates will be received by the Site Contract Administrator. Once they are checked and verified they will be signed-off by the Project Area Manager and the Construction Manager prior to the final submission for payment.

13.13.11 Liquidated Damages

Liquidated damages will be applied on a case-by-case basis where delivery is critical and there is a possibility for Nalcor to incur damages. However, it should be noted that it is not reasonable or possible to determine what the real damages may be at the outset of a contract. Liquidated damages are, in lieu of a genuine estimate of the damages and are receiving actual losses or damages.

Liquidated damages are recommended for consideration in the following instances:

- When there are engineering deliverables, which if received late, may have a adverse impact on the project by delaying work on another contract.
- When late delivery of the equipment or materials results in exposing the Client to financial costs directly related to the delivery of the equipment (such as missed vessel sailings, demurrage of cargo at port of export, costs associated with loading or offloading equipment and other related shipping costs).

- When late delivery of the equipment or materials exposes the Client to costs directly related to the construction program (such as cost of specialized equipment rentals, standby of construction labour, and overall project schedule delays).
- When specific performance criteria are outlined within the technical specification and damages are defined should the specified criteria not be achieved.
- When late completion of construction activities results in exposing the Client to financial costs directly related to the timely and quality performance of the Contractor.

13.13.12 Back Charges

All back charges will be registered by the Buyer/Site Contract Administrator (SCA) with detailed explanation as to the cause and reasons justifying the back charge along with the supporting documents and estimates. Back charges shall then be assigned to the responsible package Site Contract Administrator or Buyer responsible for the Contractor/Supplier. The Site Contract Administrator or Buyer is responsible for raising the variation order covering the back charges for their specific package, and for the administration of the request.

The Buyer/SCA shall review the terms and conditions of the Contract/PO to ensure that the Company is actually contractually entitled to back-charge the Contractor/Vendor, Buyer/SCA who shall record the back-charge in PM+ Back-charge Register.

The Buyer/SCA shall trend the events leading up to the back-charge and generate the conclusions in a File Note. The Buyer/SCA shall issue a letter notifying the Vendor/Contractor that a ‘back-charge’ is under evaluation. The Buyer/SCA will then issue a negative Variation Order for Company approval.

13.13.13 Claim Management

A register for potential claims and back charges against a contract or purchase order is kept on file. When the /Vendor issues a formal letter preserving its right under the terms and conditions to Claim in due course, the Buyer/SCA shall register an estimation in the confidential file. This confidential file is submitted to Nalcor on a monthly basis at the Claim review meetings.

A claim is defined as disputed by the Vendor that is formally submitted by the Vendor together with a cost breakdown and/ or schedule impact (through formal correspondence) in which the Vendors presents its case for entitlement. Claims received from a Vendor shall be registered in PM+ by the Buyer/SCA regardless of whether they are considered to have merit or not. The amount shall remain in PM+ until such time as the Vendor withdraws the claim in writing, or issues a Lien Waiver to the Company.

13.13.14 Closeout

Once a Vendor has completed their work in accordance with the terms and conditions of its contract then the Contract Administrator will initiate the closeout process for contracts. The Contract Administrator/Buyer will compile the closeout file including:

- Closeout request form
- Check-out list
- Closeout Memorandum
- Take-over Certificate
- Other pertinent documents

No Final Payment Certificate will be released until the Vendor has conformed to all obligations as set out in this procedure.

13.14 SPARES

Spare parts will be identified as part of the initial bid request. All proposals of equipment will be requested to identify and price recommended spare parts. After award, the engineer will review in detail the final design and the assigned expeditor will ensure that an updated list of spare parts, consistent with the final specifications, is obtained.

Installation and pre-commissioning spares may be ordered on a separate spares purchase order which will be awarded as a sub-order to the original order, but tracked and administered as a distinct order. Installation and pre-commissioning spares will be delivered to a warehouse location on site designated for the storage of these spares.

13.15 SCHEDULE

Procurement plans the pre-award and post-award activities using the planned dates developed by Planning and Scheduling and distributed on the CPN report, in accordance with the agreed schedules, the required-on-site and the required-for-construction dates. The purchasing and contracts Managers use the CPN report updated from the schedule to plan pre-award and award activities. Expediting works to these scheduled dates for the monitoring of progress in fabrication, shipments in transit and requirements for construction. Expediting evaluates potential issues within the supply chain and reports them accordingly with a recommendation for corrective actions. Office expediting reports on this first and document submittals in accordance with the CPN report and monitor subsequent submissions through the document control system. Exception reports and status reports are generated within PM+ and are used to monitor the overall progress of the supply of equipment and materials in conjunction with the anticipated requirements of construction. Overall progress and any potential delays are flagged in the progress reports issued to senior project management.

14 RISK

14.1 INTRODUCTION

14.1.1 Purpose

All key decisions made by the Lower Churchill Project team are risk-based. This approach covers activities from engineering option selection to selection a contractor or supplier for an individual work package. Hence, the LCP Risk Management System is supposed to cover all phases of the Project development from concept design and option's selection to start-up & commissioning, to operations. The Project Risk Management Plan (RMP) that fully describes the Risk Management System is one of several key management plans under the umbrella of this *Project Execution Plan* that detail how the Muskrat Falls Generation and Island Link – Land Portion (Components 1, 3 and 4) Sub-Projects of the Nalcor Energy-Lower Churchill Project (NE-LCP or the Project) will be managed in order to achieve stated goals and objectives. The Risk Management Plan provides:

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

A Risk Management System adopted by the LCP works at three levels:

- Project level;
- Component level;
- Package level.

All three levels use the same Risk Management System described in the LCP Risk Management Plan. In addition, a procedure "LCP Risk Management Requirements for Contractors and Suppliers" supports the risk activities at the package level.

14.2 RISK MANAGEMENT SYSTEM

14.2.1 Overview of the LCP Risk Management System

The LCP Risk Management System has three major elements:

- Process: steps of risk identification, risk assessment "as-is" (before addressing), risk addressing, assessment "to-be" (after addressing), retirement and acceptance of risks
- Organizational context: responsibilities of team members in the risk management process, types and frequencies of risk review meetings, risk reporting and communications including rules to prioritize risks, etc.)
- Tools: list of risk categories (Risk Breakdown Structure (RBS)), Risk Assessment Matrix (RAM) and Risk Register

14.2.2 Risk Management Process

The risk management process is comprised of four main steps as follows which combine to form an ongoing cycle.

Step 1 – Identify and Organize Risks

All risks are captured on Sub-Project (Component) 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. At package level, similar approach is used. Package risks are collected in individual package risk registers called "Package Risk Inventories".

Step 2 – Assess (Analyze) and Prioritize Risks

Each risk is given a "first-cut" priority ranking which is a function of the risk's likelihood (probability of occurrence) of occurrence and its potential consequence. Each risk may also be assessed for its inherent manageability. From there, 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. In case some risks that pertain to more than one component require support at the Project level, they are considered Project level risks.

Step 3 – Address (Mitigate) Risks

Each Key Risk is managed using a Response Plan which is developed using a Nalcor Key Risk Frame. The Response Plan will detail the recommended strategy for managing the risk (i.e., avoidance, mitigation, allocation, or acceptance). The majority of risks is not elevated to Key Risk status and is managed using Mitigation and Action Plans which are specified on the Sub-Project (component) Risk Registers.

Each risk's Risk Owner is responsible for leading the development and implementation of that risk's Response Plan Mitigation Plan or Action Plan.

Step 4 – Monitor and Control Risks

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

Main purpose of the Risk Management Process is to reduce risks of Medium and High levels to acceptable Low level. These three categories of risk severity are introduced below.

14.2.3 Organizational Context

Risk workshops and reviews are the main venues to support the Risk Management Process (steps 1 – 4 above).

Risk workshops will be conducted throughout the project. At the beginning of the project these meetings may cover the complete scope and duration of the project while others may be significantly more limited. As a minimum a risk identification meeting will be held:

- Within one month of the commencement of a major project phase to identify risks associated with the total scope of the project. The first meeting will also be used to transfer to project team all risks identified prior to the assembly of the particular project team.
- During the development of Contract Strategies for each risk critical individual package.
- At any time that the EPCM Consultant's General Project Manager, or EPCM Consultant's Risk Manager, decides that a portion of the work is about to reach a level of maturity or completeness that it would be beneficial to identify risks associated with its execution.

Frequency of risk reviews depends on level of reviewed risks. Namely, risk reviews shall be conducted for the various risk levels as follows:

Risk Level	Review Frequency
High	Bi-Weekly
Medium	Monthly
Low	Bi-Monthly

As an alternative to formal risk reviews, risks may be addresses as part of regular Project/ Component management meetings. The EPCM Consultant's Risk Manager

should issue bi-weekly risk reports to facilitate easier and effective updates of high risks.

In general risks associated with the site activities will be managed in the same way as other Project execution risks. Site Risk Reviews will be held monthly.

Following roles and responsibilities are presumed by the LCP RMP:

14.2.4 Overview of Risk Management Tools

Following risk categories (RBS) are subject to the project Risk Management Plan:

- Commercial
- Commissioning & Start-up
- Completeness
- Construction
- Environmental
- External
- Health, Safety & Security (HSS)
- Interface
- Organizational / Enterprise
- Operations
- Regulatory
- Technical

All Project, Component or Package risks and opportunities are categorized by these twelve risk categories in corresponding risk registers.

LCP adopted a Risk Assessment Matrix (Figure 14) that is based on the Matrix developed by Nalcor (document LCP-PT-MD-0000-RP-0002-01). Having five categories for probabilities and impacts the LCP Risk Assessment Matrix (RAM) measures deviations (as well as their probabilities) from six key LCP objectives related to:

- Capital Cost
- Schedule (First Power)
- Quality (Availability, Reliability, Performance)
- People (H&S)
- Environment
- Reputation

As a result and according to Figure 14-1, all identified and assessed risks could be put to three main risk level (severity) categories:

- High (“red”);
- Medium (“yellow”);
- Low (“green”).

Major LCP Risk Register tool is MOINS - RISC - LESS (Stature). It fully supports the Risk Management process adopted by LCP and utilizes the RBS and RAM described above. Next section is devoted to description of MOINS - RISC - LESS (Stature) in detail.

14.2.5 LCP Risk Registers in MOINS - RISC - LESS (Stature)

Being a relational web-based database, MOINS - RISC - LESS features several interfaces for input and output of risk information. These interfaces support all steps of project risk management introduced above.

There are three main database objects in MOINS - RISC - LESS that have ‘one-to-many’ relations:

- Risk
- Mitigation
- Action

As a matter of fact, a risk may have several mitigations. Similarly, any mitigation may have more than one action. (Each mitigation is supposed to represent one of four major risk addressing strategies – Avoid, Mitigate, Transfer and Accept - not just one of them.).

Following three main interfaces/ tables are used to manage these three main database objects, namely,

- Risk Report
- Mitigation Worksheet
- Action Log

Risk Report represents information collected about project risks including risk titles, descriptions, risk’s status, assessments before and after addressing, etc.

Mitigation Worksheet that uses mitigation numbering related to risk numbering keeps information about mitigations put forward for each particular risk.

Action Log (combined with Mitigation Worksheet) further details addressing of risks through introduction of actions. Similarly, numbering related to risks and mitigations is used.

All three interfaces are supported by drop-down menus that help assign corresponding values related to impact levels, probabilities, status, owners, etc., of risks as well as status, owners, due dates, etc., of mitigations and actions.

Figures 14-2 – 14-3 represent samples of the interfaces introduced above.

Project level and component level risks are collected in the LCP Master Risk Register in *MOINS* - ***RISC*** - *LESS*. For the purpose of identification and sorting, these risks have tags C1, C3, C4 and LCP, correspondingly.

Package level risks are collected in package individual files in *MOINS* - ***RISC*** - *LESS*. In case package risks have Medium or High Level according to the RAM of Figure 14-1, they are included to the Master Risk Register. The rest of the package risks (Low level) are kept in package Risk Registers (Package Risk Inventories). Figure 14-4 outlines procurement risk management workflow that deals with package risks.

Some component level risks that pertain to more than one component and/ or require support at the Project level could be escalated to the Project (LCP) level. As a rule, LCP level risk owner(s) should coordinate addressing corresponding risks at the component levels. A Project level risk could become one of the Key Risks (section 14.2.2). Otherwise its purpose would be to support and coordinate at the Project level addressing of corresponding component risks.

14.3 ADDITIONAL RISK MANAGEMENT METHODS

The risk management framework introduced above in this document represents the core of the LCP Risk Management System. Its results may be used as inputs to five additional risk-based decision techniques to be used *ad hoc*. Detail procedures on their applications will be developed as soon as there is a need to use them. Below these methods are introduced at higher level.

14.3.1 Scope Optimization

It is not unusual that several engineering options are considered when developing Project scope. Besides engineering criteria option's overall risk exposure should be taken into account to find optimal option. This method could be used to define value engineering changes and support corresponding engineering decisions.

Although Risk Registers for each viable option should be developed, considered should be only risks that are unique for each option ('risk differentiators'). Ranking

scores should be calculated for each risk, which is a product of impact score and probability score defined by the LCP RAM (Figure 14-1). In case, a risk has impact on more than one Project objectives, weighted sum of corresponding impact ranking scores could be used to represent the total risk score.

The sums of all risk scores for each option may be used to compare option's risk exposures. In case of opportunities, their scores should be subtracted from the option's scores.

Obviously, the option with lowest ranking score should be considered as preferable.

Although this method is straightforward and easy to use, it doesn't provide monetary assessment of option's risked costs. Same time it takes in to account impacts on all six Project objectives reflected in the LCP Risk Ranking Matrix.

14.3.2 Decision Tree Analysis

The option selection may be represented graphically as a 'decision tree' that has a 'root' (major decision to be done), 'major branches' (major options to consider and compare) and 'secondary branches' and 'leaves' (risks attributed to each option to be considered).

The risks identified for each option are used to define the 'secondary branches' and 'leaves'. Each risk may be represented by expected value (probable consequence) which is a product of risk probability and cost impact (defined in monetary values). Several options may be evaluated as routes from the 'root' to each terminal 'leaf'. The 'root' to 'leaves' sums of all expected values are to provide assessments of risked costs for each option. This information may be used for comparison of options and decision making.

14.3.3 Probabilistic Risk Analysis

Probabilistic cost or schedule risk analysis allows represent Project costs or completion dates as distributions as opposed to one-point numbers. Integrated cost & schedule risk analysis may be undertaken to define Project cost distributions that takes into account schedule driven costs. (The probabilistic cost risk analyses or integrated cost & schedule risk analyses for several options may be used as most advanced method of cost-risk-based selection of scope options in value engineering.)

The cost or schedule risk contingencies could be established at any confidence level using the distributions. The contingency criteria should be defined by either corresponding corporate procedure or decision of LCP leadership team. Sensitivity analysis that is part of probabilistic risk analysis provides additional information on most sensitive risks as well as supports decision making on effective contingency allocation.

Figure 14-1: LCP Risk Ranking Matrix

Risk Ranking Score = (Impact Score) x (Probability Score)	Risk Level Colour Code	Low	Medium	High

		IMPACT				
		Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
PROBABILITY	>90% Almost Certain (5)	5	10	15	20	25
	50% - 90% Likely (4)	4	8	12	16	20
	1% - 50% Possible (3)	3	6	9	12	15
	0.1% - 1% Low (2)	2	4	6	8	10
	< 0.1% Rare (1)	1	2	3	4	5
PROJECT OBJECTIVES	**Capital Cost, $M**	**< 0.1**	**0.1 - 1**	**1 -- 10**	**10 - 100**	**>100**
	Schedule, Mos (First Power Target Date)	**< 0.25**	**0.25 - 1**	**1 -- 3**	**3 -- 12**	**>12**
	Product Quality (Availability, Reliability, Performance)	Potential degradation of element performance, system level not affected.	Decrease in system performance, however still above requirement.	Decrease in system performance eliminates all design and operating margins.	Decrease is system performance that substantially affects performance objectives.	System requirement is not achieved, safety objectives are not achievable. System or element is effectively useless.
	People (Health & Safety)	Minor impact on personnel. First aid only. No lost time.	Potential to cause medical treatment of personnel. Lost time incident.	Injury to personnel that does not result in some permanent disability. Multiple lost time incidents outside established targets.	Serious personal injury resulting in permanent disability. Total lost time well outside established targets to the point where operations are temporarily suspended.	Potential to cause single or multiple fatalities.
	Environmental (Physical)	Slight Effect: e.g. Non-reportable spill or release contained within the immediate work area, negligible financial consequences, no lasting effect.	Minor Effect: e.g. Sufficiently large contamination or discharge to damage environment, but no lasting effect. Single breach of statutory or prescribed limit or single complaint.	Localized Effect: e.g. limited discharges affecting the local area and damaging the environment. Repeated breaches of statutory/regulatory limit or multiple complaints.	Major Effect: e.g. Severe environmental damage. The company is required to take extensive measures to restore the damaged environment. Regulatory restriction or enforcement action probable.	Massive Effect: e.g. Persistent severe environmental damage or severe impact extending over a large area resulting in major financial implications for the Project. Direct impact on public with prosecution possible.
	Reputation/ Image	No or very minor media attention. Little or no loss in stakeholder trust/commitment.	Some unfavorable media attention. Some loss in stakeholder trust/commitment which can easily be rebuilt.	Local media coverage only. Some loss in stakeholder trust/commitment that will require commitment to rebuild.	Local and possibly national media coverage. A loss in stakeholder trust/commitment that it is doubtful whether it can be rebuilt.	National and international media coverage. An irreparable loss in stakeholder trust/commitment.

Figure 14-2: Sample Risk Report

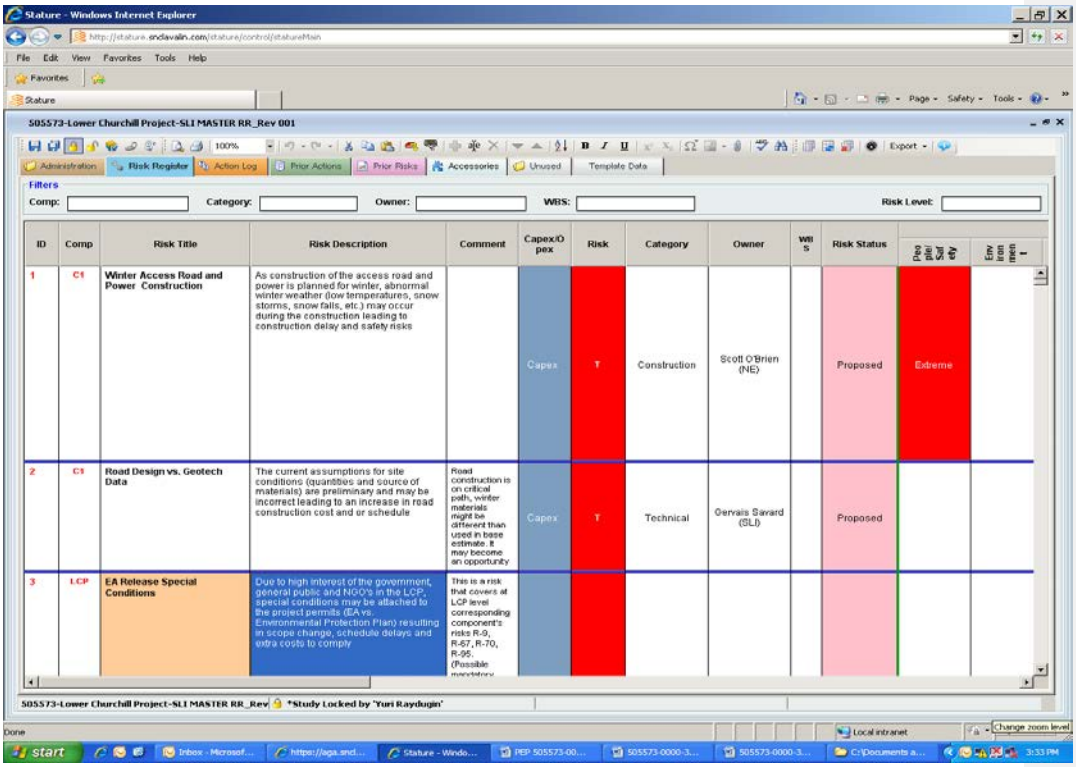
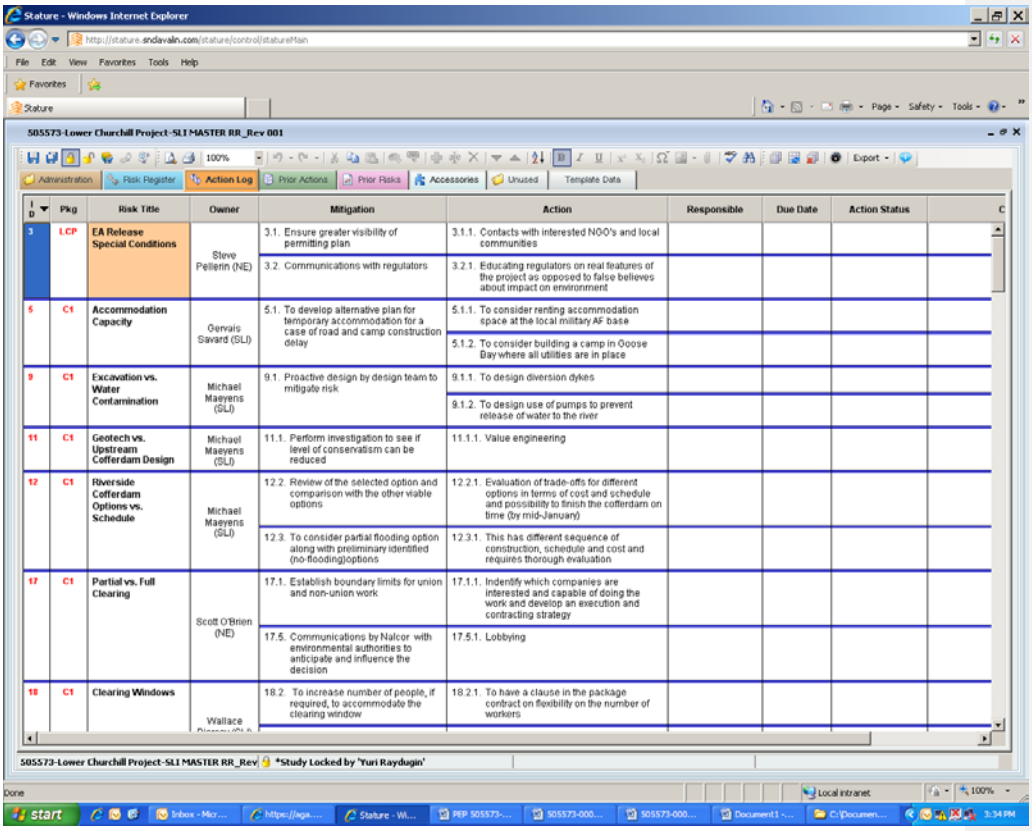
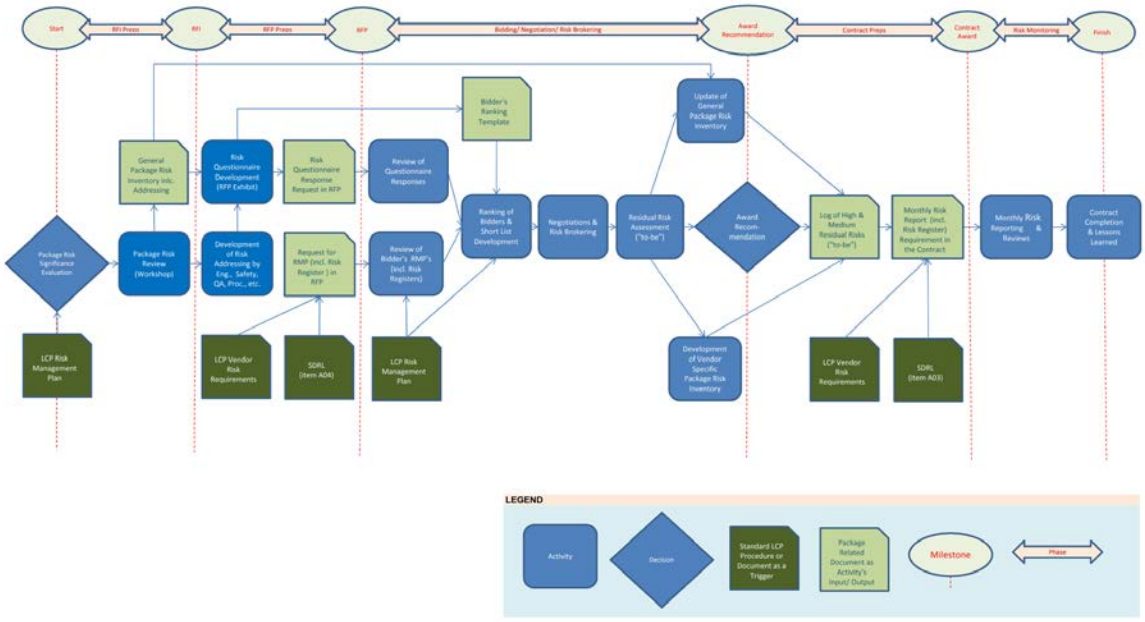


Figure 14-3: Sample Mitigation & Action Worksheet



ID	Pkg	Risk Title	Owner	Mitigation	Action	Responsible	Due Date	Action Status
3	LCP	EA Release Special Conditions	Steve Pellerin (NE)	3.1. Ensure greater visibility of permitting plan	3.1.1. Contacts with interested NGO's and local communities			
				3.2. Communications with regulators	3.2.1. Educating regulators on real features of the project as opposed to false believes about impact on environment			
5	C1	Accommodation Capacity	Gervais Savard (SLI)	5.1. To develop alternative plan for temporary accommodation for a case of road and camp construction delay	5.1.1. To consider renting accommodation space at the local military AF base			
					5.1.2. To consider building a camp in Goose Bay where all utilities are in place			
9	C1	Excavation vs. Water Contamination	Michael Maeyens (SLI)	9.1. Proactive design by design team to mitigate risk	9.1.1. To design diversion dykes			
					9.1.2. To design use of pumps to prevent release of water to the river			
11	C1	Geotech vs. Upstream Cofferdam Design	Michael Maeyens (SLI)	11.1. Perform investigation to see if level of conservatism can be reduced	11.1.1. Value engineering			
12	C1	Riverside Cofferdam Options vs. Schedule	Michael Maeyens (SLI)	12.2. Review of the selected option and comparison with the other viable options	12.2.1. Evaluation of trade-offs for different options in terms of cost and schedule and possibility to finish the cofferdam on time (by mid-January)			
				12.3. To consider partial flooding option along with preliminary identified (no-flooding)options	12.3.1. This has different sequence of construction, schedule and cost and requires thorough evaluation			
17	C1	Partial vs. Full Clearing	Scott O'Brien (NE)	17.1. Establish boundary limits for union and non-union work	17.1.1. Indentify which companies are interested and capable of doing the work and develop an execution and contracting strategy			
				17.5. Communications by Nalcor with environmental authorities to anticipate and influence the decision	17.5.1. Lobbying			
18	C1	Clearing Windows	Wallace	18.2. To increase number of people, if required, to accommodate the clearing window	18.2.1. To have a clause in the package contract on flexibility on the number of workers			

Figure 14-4: Package Risk Management Workflow



15 CONSTRUCTION EXECUTION PLAN

15.1 INTRODUCTION

Construction Management will form a highly qualified construction management team taking full advantages of the experience and the Lessons Learned of similar projects, with full knowledge and understanding of Project H&S regulations and the ability to manage and control all aspects of the construction activities described below.

I think there are missing article about site camp and offices. Construction management team accommodation, transportation, rotation, entertainments. Strategy to attract and maintain qualified personnel at site in hot market.

15.2 OBJECTIVES AND CONSTRUCTION STRATEGY

The prime objective of construction is to construct a Hydroelectric Development and supporting transmission infrastructure that will meet the highest standards of environment and quality, budget and schedule, and all of the Key Performance Indicators (KPIs).

15.2.1 Strategy

The overall strategy on the Project site is to adopt a safe site-driven low risk plan whilst delivering the plant substantially complete in accordance with the project schedule and cost.

The strategy is underpinned by the creation of a safe working environment and development of a strong safety culture, shared by all employees and visitors during the site construction phase of the project. The health and safety of all employees and visitors on the project is of paramount importance.

The environmental requirements are contained in the Project Environmental Plan. Compliance will be rigorously enforced during the construction phase.

Schedule and cost risks will be strict monitoring control of contractor's progress. Cost and Schedule trend reports will be instrumental in early detection of issues so that mitigation measures can be implemented as quickly as possible to ensure that construction targets are met.

15.3 CONSTRUCTION MANAGEMENT ORGANIZATION

15.3.1 Introduction

SLI proposes a project organization and staffing plan developed in a matrix format to ensure that the project schedule is entirely construction driven and that the capital cost of each area is kept under constant control, whilst ensuring very high standards of environment, health and safety and quality. It is developed around the traditional concept of discipline Managers added by the matrix dimension of Area Managers.

15.3.2 Responsibilities

Construction management has the overall responsibility to manage all aspects of construction on site including coordination of Industrial Relations, contract administration, site planning, estimating and cost control, construction services, the overall management of construction contracts and Contractors and all other aspects of construction i.e. area and inter-area coordination, infrastructures, prefabrication, pre-casting, pre-assemblies and construction support. Although H&S and Quality control and assurance fall under Project Management, H&S advisors and quality inspectors will be deployed in construction areas to favour a more direct relationship and more direct action as necessary.

The following management activities will be performed by the various construction areas and departments as described further:

- Coordinate and direct work to be performed by works Contractors in accordance with the relevant legislation pertaining thereto to facilitate and promote orderly, clean and incident free construction sites.
- Effectively resource and manage the construction contract closeout process based on well defined “contract end”, ensuring appropriate continuity and a seamless and orderly handover to COMPLETIONS and eventually to Operations upon final demobilization.
- Supervise works Contractors so that construction work complies with designs, drawings, estimates and surveys as well as all pertaining project rules, regulations and procedures.
- Assess all variations and changes from the specification, schedule and costs with respect to the contracts of works Contractors and secure Client written approval as per the Project Procedures.
- Ensure updating of as-built drawings.

- Prepare deficiency reports and require that the works Contractors correct the deficiencies in due diligence.
- Issue certificates of acceptance of work at various predefined levels.
- Inform Nalcor of any potential industrial relations disputes or labour unrest.
- Manage the interfaces between the construction contracts as well as all the other contracts.
- Manage occupational Health and safety on the construction sites in accordance with the project H&S Plan and procedures with the objectives of zero injury.
- Manage the construction interfaces between the various works Contractors in accordance with their contracts and the site conditions which may vary during the course of the implementation of construction contracts and works.
- Manage the construction work in accordance with the project Environmental Management Plan to facilitate and promote achievement of all environmental standards and targets or better.
- Prepare and execute a construction plan which will result in the best possible productivity, built-in quality and conformity on the various construction sites, with continuous updating through thorough and sound coordination and sound construction methods.
- Manage the construction work with the objectives of achieving a zero rework philosophy and minimal deficiencies at Mechanical Completion.
- Establish, manage and maintain construction services facilitating high safety, security, cleanliness and high productivity on the part of works Contractors.
- Together with Project H&S, establish an emergency response system and committees to deal with emergencies at the construction sites and ensure preparedness if and when the need arises to take action.
- Transfer installed equipment to Completions team and arrange the execution of the work required by the Completions team particularly with respect to works Contractors interfaces and in relation to safe access to equipment through well defined isolation, lockout and permitting systems.
- Develop in conjunction with Nalcor, a formal industrial relations policy and plan to cover basic principles of site industrial relations and administer it, ensuring compliance with all provisions.

15.3.3 Organization

A matrix-based construction management organization effectively mirroring the overall project management organization is being used, based on the area management concept supported by functional disciplines, effectively replicating the

form and functions of the overall project management organizational structure. The Construction Organizational Chart is shown in APPENDIX C, Chart 7.

Each site component Construction Manager reports to the Project Manager and is accountable to him for successfully delivering all aspects of H&S, quality, industrial relations, construction contracts implementation, actual work performed on site and the related construction support services rendered by the functional departments.

Construction General Superintendents (Area Construction Managers), whilst reporting to the site Construction Manager, are responsible to their respective project Area Manager for the construction execution and delivery of their area of responsibility to the Completions Team. They are supported by H&S advisors of project H&S and quality inspectors of QA/QC deployed in their area, and by functional support personnel in Contract Administration, Planning and Scheduling, Construction Coordination, Discipline Supervisors and Engineering Support. All area functional personnel have a functional relationship with the site Functional Manager who approves the selection of personnel as well as the methods used to perform their work.

Each of the Functional Managers whilst reporting to the site Construction Manager is in turn responsible to Functional Managers of the project management team to ensure delivery of their department responsibility on site and ensure standard operating procedures in all construction areas.

15.3.4 Focus and Advantages

The construction organization requires strong management personnel with a high degree of versatility, open mind to new ideas, with not only technical knowledge but also good general management ability and good contract administration capabilities.

The construction organization will present a strong focus on:

- Environment Health and Safety
- Quality in all disciplines
- Construction driven in order to meet the project schedule targets
- Minimization of costs

The construction matrix organization presents several advantages:

- Single point responsibility and accountability
- Single point of communication with the Contractors

- Close control of H&S and Industrial Relations
- Tighter and more direct contract administration with Contractors
- Direct control of contract changes and minimization of claims
- Coordination of all disciplines within the area

15.3.5 Site Resident Engineer

- Act as the Field Resident Engineer and as such assures the liaison with the project Engineering Manager on site.
- Close relationship with QA/QC management to assure quality control and quality assurance on site.
- Overall responsibility of site drawings, specifications and document control.
- As-built drawings. Must liaise with Area Construction Managers to assure the delivery of as-built drawings by Contractors prior to final payment.
- Review and acceptance, with the area Construction Manager or QA/QC of construction inspectors, engineers and coordinators.
- Liaison with QA/QC, area Construction Managers and COMPLETIONS regarding the development and clearance of deficiency or wish lists.
- Liaison with the Project Liaison Manager for permits licences, etc.

15.3.6 Site Project Controls

- Overall responsibility of Planning, Estimating and Cost Control on site
- Review and acceptance of controls personnel under the area Construction Managers
- Overall responsibility of progress monitoring, construction monthly and weekly reports
- Liaison with project controls

15.3.7 Site Contract Administration

- Reports to the Area Construction Manager.
- Review and processing as per construction procedures of all Contractors' progress billing.
- Review of all change notices, change orders and contract amendments prior to formal approval by construction, Area Manager, project or Nalcor's authorities.
- General review and recommendation of all Contractors' claims (construction and service contracts).
- Contract closeout procedure.

- Participation to settlement of claims with area contract administrators and area Construction Managers.
- Liaison with Project Procurement Manager.

15.3.8 Industrial Relations Coordinator

Together with H&S and area coordination, Industrial Relations coordination represents a very important function to assure the success of construction within the target schedule and cost. As mentioned in the Lessons Learned, it is important to detect any IR unrest early to assure early settlement and avoid lost time. This is why the position of IR coordinator has been introduced for the project. He will be responsible to develop an IR Plan as part of the Construction Execution plan as well as IR procedures to be adhered to by all Contractors and more specifically to assure a direct requirement for IR representatives to become part of the overall IR management on site.

15.4 MANAGING H&S

The Project Management of SLI has a primary objective to continuously improve in achieving the highest standards in H&S performance during the construction phase.

Each on-site Contractor will carry the prime responsibility for the environment and the health and safety of its own employees. All work practices will be governed in accordance with the Law and by-laws applicable as well as the Project H&S Plan.

The entire implementation of the plan for the project falls under the direct responsibility of the H&S Manager who reports directly to the General Project Manager. It is understood however that in order to achieve the highest standards of H&S, the site Construction Manager and the entire construction management must work in a very close relationship with the H&S Manager and his personnel.

SLI will have a responsibility to ensure that all Contractors comply with all rules and regulations and with the Project H&S Plan.

To this effect, the site Construction Manager will continue to liaise closely with the H&S Manager and the site H&S Coordinators in the implementation of all activities and requirements contained in the H&S Plan. Such close relationship is extended to the entire construction organization. Indeed, as shown in the organization charts, all H&S advisors although functionally reporting to the H&S Manager, are deployed inside each area.

H&S is a line management responsibility and it extends from the site Construction Manager down to the Area Managers, the Discipline Supervisors, Engineers and Inspectors within each area, as well as to all levels of Contractors' organization.

Various H&S requirements for Contractors are not only covered in the H&S plan but also in the contractual documents. It is therefore the direct responsibility of the area Construction Managers and their personnel to assure that contractual requirements are fulfilled by Contractors in their respective areas as part of the normal contract administration activities. Furthermore, facing a delinquent Contractor, the area Construction Manager will take all necessary actions decided by and with the H&S Management to correct the situation created within or around the Contractor’s work area.

All requirements, audits, reviews, safety steering committee meetings, coordination meetings, tool box meetings, etc., will be detailed by the H&S Plan and the H&S team of the Project. Construction management will actively participate in all such activities.

15.5 MANAGING ENVIRONMENT

The Environment Manager will develop the Environmental Management Plan which will be implemented similarly as the health and safety described above. Contractors will be monitored for the integrity of their environmental plans at various stages prior to start of construction and continually throughout construction.

The construction related environmental impacts will be covered by the EMP and will include such activities as:

- Separation, recycling and safe disposal of waste generated during construction including:
  - Building rubbles
  - Wooden crates and pallets broken down into their component parts
  - Hazardous wastes such as oil, paint, tar, batteries, fluorescent tubes, paint cleaners, etc.
  - Domestic wastes
  - Scrap metal
  - Sanitary waste
- Enforcement of good housekeeping practices by Contractors
- Vermin control

- On site vehicle maintenance and refueling
- Vehicle and equipment maintenance and refueling
- Vehicle and equipment washing
- Washing and cleaning of concrete transport vehicles
- Transport
- Dust control
- Control on open fires
- Control of storm water
- Wildlife monitoring and control

All site related environment matters will be monitored not only by Environmental function within the EPCM team but also by the entire construction group. Construction will ensure that the collection and safe disposal of wastes to designated area by the waste management Contractor is carried out properly. The management of the designated disposal areas will be in accordance with the requirement specified in the EMP.

15.6 MANAGING QUALITY

The Project Management of SLI has a primary objective to continuously improve in achieving the highest standards of quality performance during the construction phase. The overall philosophy for the QA/QC function on the project is described in Section 9 of the present document.

All Contractors will carry the prime responsibility for the quality of their work. To this effect, they must implement a Quality Management System which complies with the current requirements of ISO 9001 or adopt a comparable QMS which has been agreed with Nalcor prior to the effective date of the contract. They will also execute their work in accordance with a QC inspection and test plan. These contract specific QC inspection and test plans describe the system, organization and methods by which the Contractors will manage their work.

The QC inspector under the responsibility of his QA/QC Supervisor is responsible to ensure collect and validation of QC records and test reports resulted from his day-to-day QC surveillance of works as per the approved ITP. The QC documentation shall be reviewed by the QA/QC Supervisor who is working under the project QA/QC

Manager. The QA/QC Supervisor is responsible to maintain all QC records required for the mechanical acceptance certificate.

The entire implementation of the Project Quality Plan for the project falls under the direct responsibility of the Project QA/QC Manager who reports directly to the Project Manager. It is understood however that in order to achieve the highest standards or quality, the site Construction Manager and the entire construction management must work in close relationship with the QA/QC Manager and his personnel.

To carry out surveillance and inspection requirements in line with the Quality Plan and in accordance with the drawings and specifications, QC inspectors, directly reporting to the QA/QC Supervisor working under the project QA/QC Manager will be integrated inside each of the construction areas. They will participate with the area Construction Supervisors and engineers to the day-to-day inspection of the works under construction and carry-out their reporting duties as set forth by Project QA/QC.

Construction Management considers that Quality is a line management responsibility and therefore will require commitment and involvement be all construction personnel including the Site Construction Manager, his Deputy, the resident engineer and his personnel, the area Construction Manager, the Construction Supervisors and the Area Engineers.

To achieve this goal, a number of measures have been introduced in the construction management organization to assure the high quality standards and an adequate check-and-balance for quality management. They are:

- The QC inspectors are working under the functional responsibility of the QA/QC Supervisor reporting directly to the Project QA/QC Manager. The QA/QC Supervisor and his team of inspectors are deployed in the Construction Area facility for more direct knowledge of the day-to-day work and a more direct action when required.
- A functional line relationship has been established between the inspectors and the Site Resident Engineer.
- A functional line relationship has been established between the Site Resident Engineer and the Project QA/QC Manager and this, over and above the usual functional relationship with the Engineering Manager.
- The Site Resident Engineer in conjunction with QA/QC and Project Engineering will have the direct responsibility to establish site standards.
- Construction management will have centralized site-wide testing and inspection services

- The soils, concrete, welding and laboratory will be under the responsibility of the Project QA/QC Manager and his team.
- Tight control of deficiencies. They will be actioned by the area Construction Managers and the Contractors but will be signed off by both QC and the Resident Engineer.
- Tight control of scope changes through the Area Manager, the area Construction Manager and the Resident Engineer.
- The quality control documentation will be kept up-to-date by the Area QA/QC Supervisor in line with the project requirements to support the mechanical completion and handover of the sub-system, system or facility.
- Direct control and final approval of mechanical completion through the area Construction Manager, the site resident engineer for the As-built drawings and OE Manuals, and QA/QC for the complete QC documentation.
- Efficient check-and balance between the Area Engineers and the pre-commissioning team.

15.7 MANAGING INDUSTRIAL RELATIONS

The Industrial Relations on Site must be managed in accordance with the Special Project Labour Agreement pursuant to Section 70(1) (a) of the Labour Relations Act of Newfoundland and Labrador. The IR Coordinator, reporting directly to the Site Construction Manager, will have the responsibility of the implementation and administration of the Project Labour Agreement.

The IR coordinator will ensure that all Contractors abide strictly to the Labour agreement. An Industrial Relations program will be put in place for the construction work covering items such as:

- Establishment of an industrial relations policy.
- Terms and conditions of employment of construction workers employed by Contractors on the site.
- Site rules and standards.
- Access control to Site by all Contractors and their personnel.
- Contractors being bound to the Project Labour Agreement and becoming a member of the Project Employer's Association.

The IR Coordinator will liaise with H&S and Construction Campsite management to establish the rules and regulations applicable to the Accommodations Complex.

All Contractors are bound to follow the directions of SLI Industrial Relations with respect to determining composition of work teams and assignment of work within the scope of the mark-up.

All Contractors must appoint an experienced employee who will be responsible for industrial relations matters on site. This position will:

- be approved by the IR Coordinator and Site Construction Manager;
- be responsible for managing Industrial Relations and any other employee-related function of the Contractor or Sub-contractors on Site;
- day to day administration of the Project Labour Agreement;
- attend all IR matters arising with the Contractor's employees;
- represent the Contractor at all industrial relations meetings held by the IR Coordinator.
- Attend regularly scheduled meetings held by IR Coordinator; and
- Notify the IR Coordinator of any formal discipline or any significant Industrial Relations issues that arise on a daily basis.

Similarly as for the H&S safety officers of the Contractors, the IR Coordinator will ensure that the entire group of IR practitioners of the Contractor works to the same goal.

During the construction phase the IR coordinator will hold regular meetings with the IR coordinators of all Contractors as well as regular field interventions to detect any labour unrest at the early stage and find quick solutions. He will inform the client as to any potential conflict.

If necessary he will, as authorized by Nalcor, participate in negotiations with the Contractors' representatives to resolve any industrial dispute which may arise.

15.8 SITE ENGINEERING AND RELATED FUNCTIONS

The Site Resident Engineer, reporting to the Site Construction Manager and supported by the supervising personnel included in the organization chart shown earlier will be responsible for the overall site engineering. He will functionally liaise with the Project Engineering Manager as well as the QA/QC Manager. He will be directly responsible for:

15.8.1 Site Engineering

- To this effect, site Engineering will report directly to the Site Resident Engineer who will supervise the drafting room.
- Engineers of various disciplines are deployed in the construction areas. They cover civil, structural, mechanical, electrical and instrumentation engineering as per the needs of each area. They ensure that all drawings and specifications of contracts are the latest “issued for construction”.
- They interpret in conjunction with the site Engineering Supervisor the project specification requirements and construction drawings for Construction Supervisors and Contractors and resolve any associated queries.
- They recommend changes in cases of interference or constructability problems. They will resolve all non-conformances revealed as a result of inspection or testing, rejecting the work, accepting concessions from the Contractor or recommending derogations when applicable.
- The site resident engineer or the Engineering Supervisor will participate in the acceptance of all engineering personnel deployed in the various construction areas

15.8.2 As-Built Coordination

The As-Built coordinator, reporting directly to the Site Resident Engineer, will be responsible to coordinate the delivery of all as-built drawings prior to contract closeout. The delivery of as-built drawings is part of the contract closeout procedure within each contract and, as such, falls under the direct responsibility of the area Construction Managers and the Area Engineers. The as-built coordinator will support and assist the “As-Built” field verification process for all disciplines and package interface to ensure quality delivery prior to the Resident Engineer’ approval or contract closeout as the case may be.

15.8.3 Surveying Supervisor

The Surveying team will monitor, verify and accept all surveying done by the Contractors on site. It will be supervised by the Surveying Supervisors who will report to Resident Engineer. He will also be responsible to establish the control base for surveying for all contracts.

15.8.4 Specialist Laboratories

On site a services contract will be left for laboratories to carry out soils testing and concrete testing as part of its EPCM services. Specific contracts will also be awarded

to other specialist inspection agencies for structural steel inspection (X-Rays and others), water quality, etc., with the support of the Site Contract Administration Manager; they will be responsible to administer such contracts in accordance with the contract administration procedures, they will report to the Resident Engineer.

15.8.5 Mechanical Completion

Each construction Contractors' scope of work will include completion of all works up to and including mechanical completion, including testing and documentation as required by the contract specifications.

The work includes installation testing and may include also preparatory work for pre-commissioning or commissioning as identified in the respective contracts and as may be required by the Completions team. In general, turnkey contracts quill require that the Contractor commission its own systems including testing; then, it will be attended and checked by the area construction management as well as mechanical completion coordinators.

In some cases, Vendor engineers and representatives may have to be seconded to site to supervise installation, testing and commissioning of their equipment as per the contractual terms and conditions. They then will:

- oversee the erection, installation and testing of specific equipment in accordance with defined specifications and procedures;
- advise and assist during system testing, commissioning, start-up; and
- running-in of materials and machinery as defined in the specifications and procedures.

Generally, mechanical completion is executed by systems for a smooth handover to Completions. Although the mechanical completion is a construction area responsibility, The Resident Engineer will participate by ensuring that all as-built drawings have been produced as well as the Operations and Maintenance Manuals. Because of the complexity of the full mechanical completion and the number of systems involved, it will be coordinated by mechanical completion coordinators under the direct responsibility of the Resident Engineer and deployed in each area on a need basis.

15.8.6 Site Document Control

The Project Document Control is under the responsibility of the Project Control Manager. Similarly, in construction, the document control is under the responsibility of the Site Control Manager. The construction document controller although reporting directly to the Control Manager will have a functional relationship with the project document controller with regards to methods and procedures.

The site document control will be responsible for maintaining site libraries of technical data such as drawings, requisitions, standards, specifications, manuals and procedures. In addition, it will ensure that new documents are distributed to Contractors and SLI promptly and that all issues are documented and recorded in the document control management system.

All Contractors and Vendors documents will be exchanged with SLI through the PDM system and then recorded in the aforementioned SPF.

Document Control procedures will control borrowing, copying and returning documents and ensure maintenance of confidentiality as required under the terms of the EPCM contract.

15.9 MANAGING CONTRACT ADMINISTRATION

15.9.1 Site Material Control

The Site Control Manager and the team will report directly to the Construction Manager and functionally to the Project Procurement Manager, will remain functionally responsible to the project office for the methods of work and systems applied to the job. Using the SLI PM+ Materials Management system, he will monitor the work progress and identify material requirements and shortages.

His responsibilities also include receiving and checking all materials, preparing receiving reports, OS&D (over, shortage and damaged), insurance claims, warehousing and issuance of all materials and equipment to the construction areas and services.

He shall determine with which work packages construction may proceed. He will identify a list of critical materials, often with area planners and schedulers, and if material shortages are causing delays, he will work with project expediting and logistics, confirm if deliveries can be advanced, or through the area Construction

Manager and the resident engineer, obtain authorization to effect a material substitution permitting the construction work to proceed.

He will monitor the use of material for construction, particularly the free issue materials, monitors lost, damaged or scrap materials, and, in accordance with the project policies, will arrange, through the warehouse, for disposal of any surplus or scrap materials.

15.9.2 Area Contract Administration

In the area, the contract administration will be implemented by the area contract administrators under the direct responsibility of the area Construction Managers. Their functional link is the Procurment Manager. They will perform the duties required by the area, using the methodology and principles issued by Site Contract Administration. The performance will then be measured both by the Area Construction Manager and by the Site Contract Administration Manager.

The area contract administrator duties will cover:

- General administration of the construction contract.
- Preparation of all correspondence to the Contractors to be approved and signed by the area Construction Manager.
- With the quantity surveyors, estimators and generally Project Controls where required he will verify, modify with the Contractors as necessary, and recommend for payment of all progress invoices of Contractors.
- Preparation of all documents transmitted to and obtained from Contractors as part of the negotiations process for submission and approval of change notices, change orders and contract amendments.
- Monitoring of contractual deliverables by the Contractor.
- Maintenance of contractual documentation.
- Maintain a record of contractual discussions and meetings.
- Negotiations with the Contractors concerning the site instructions, change orders and contract amendments, preparation of all necessary documents required for approval and submission through the Site Contract Administration Manager.
- Participation in the negotiation of all claims submitted by Contractors and preparation of all documentation required to accept and process for approval or reject of such claims, as per the project procedures.
- Preparation of contract closeout procedure for all contracts in the area.

15.10 MANAGING SITE PROJECT CONTROLS

The Site PECC Manager reporting directly to the Site Construction Manager and supported by the supervising personnel shown in the organization chart shown earlier in this report is responsible for the overall site planning, estimating and cost control activities. More specifically he is directly responsible for:

- Monitoring and reporting Contractors progress on site
- Cost control and reporting
- Planning and scheduling of the work
- Preparation of the Construction weekly and monthly reports

The Site PECC Manager is the Functional Manager for area planning, estimating and cost control. As such, he will have authority to develop standard methods used for controls implemented within each area. He will participate in the acceptance of all planning, estimating and cost control personnel deployed in all areas and monitor the quality and the volume of work produced by the PECC personnel of all areas. He will have the direct responsibility to assure that standard methods are used in the various Controls activities performed in the Areas and functional services.

15.10.1 Area Project Controls

In the areas, as support to the contract administrators particularly in their roles of monitoring progress for payments, or estimating the impact of site instructions, change orders, contract amendments and claims, estimators will be deployed on an as required basis. The number and qualifications will vary with the work in progress i.e. civil, concrete, structural steel, cladding and roofing, mechanical, electrical and instrumentation installation, such that the estimators may have to be moved from one area to another as the needs occur.

In each area, planners will be supported by schedulers. They will report directly to the area Construction Manager and report functionally to the Site Planning Supervisor. They will be responsible for:

- Monitoring and reporting the progress of the Contractors in the area using the tools and methods prescribed by Project and Site Controls. They will act as support, as needs be, to the contract administrators to evaluate the work progress of each contract for monthly invoices.

- Liaise with the Area Coordinator and Supervisors to maintain the work schedule, monitor any delays and participate in the development of mitigation measures when required.
- Preparation of the area weekly report and the area monthly report for the area Construction Manager approval and transmission to the Site PECC Manager for inclusion in the Site reports.

15.11 MANAGING CONSTRUCTION SERVICES

The Site Construction Services Manager, reporting directly to the Site Construction Manager and supported by supervisors as per the construction organization chart will be responsible for the following services:

- Central site office management maintenance and supplies.
- Construction management site office.
- Area construction site offices.
- Satellite area construction offices.
- For the above, the Construction Services Manager, with Procurement, will prepare a service contract to cover maintenance and janitorial services for all site offices, facilities, amenities, roads and others.
- Where required, construction of fencing isolating the construction area from the operations area to ensure maximum autonomy of Construction and minimal disruption of Operations. In addition, Construction services will hold prefabricated fencing modules to be available for installation in Completions and Commissioning areas when required.
- Construction of temporary accesses with electronic identification system as determined by the Feasibility Study and as required during the implementation phase.
- Construction and maintenance of the temporary warehouse and the related outside storage area as determined early in the project.
- Construction and management of the temporary power line, temporary lighting, diesel generator.
- Management of the electrical service contract.
- Construction of and maintenance of temporary roads.
- Construction of temporary sewage service network on site. Ablution blocks and portable single unit toilets will be installed at key locations inside the various construction areas. In the Contractor laydown areas, the ablution services will be under the responsibility of the Contractor who will link its services to the

construction network. However, the sewage tanks will be emptied by the Site Service Contract.

- The Construction Services Manager is responsible for the construction and maintenance of a water supply reticulation to various key construction areas. To ensure water supply in laydown areas as well as the supply of concrete curing water, water Contractors' tankers will fill from a truck filling station and distributed by the Contractors to their respective areas as they need.
- The Construction Services Manager will be responsible for the allocation of holding areas for special construction equipment as follows:
  - Contractors will be pre-qualified for the supply of specific construction equipment such as heavy lift cranes, tower cranes, cherry pickers, scissor lifts, forklifts, scaffolding, etc.
  - Construction services will allocate laydown areas to all pre-qualified Vendors upon confirmation of purchase orders from a works Contractor. The supply of equipment is performed on a "free market" basis.
  - Other Supplier's may supply such equipment on a "free market" basis without a dedicated laydown area.
- Construction, maintenance and arrangement for disposal through recycling of all construction wastes. In particular, the construction services will operate a concrete crushing plant where the crushed materials will be recycled for the construction of roads and laydown areas.
- Management of waste transit facilities and skip removal available to Contractors through a service contract.
- Establishment of laydown areas for Contractors as per the layouts defined during the Feasibility Study.
- Establishment of telephone and IT networks to all EPCM facilities. Contractors are required to provide their own Wi-Fi systems.
- Installation of a separate construction radio network to serve the project and particularly construction and COMPLETIONS needs.
- Installation of concrete batching plants.
- Establishment of pre-assembly areas.
- The Construction services will act as part of the early works to build the facilities defined in the study.
- The site Service Contracts (electrical, general services, janitorial, etc.) are performed on a 24 hours and 7 days a week basis. To facilitate such management and for immediate response in emergencies, the service Contractors work force, will be lodged near site.

- Final Clean Up - The final clean up of Contractors' laydown areas is a contractual responsibility of the Contractor and as such, it becomes part of the contract closeout procedure implemented by the area Construction Manager responsible. However, it will be the direct responsibility of the Construction Services Manager to proceed with the final clean up of site prior to final handover to operation. It will include without limitations:
  - Demobilization of all temporary offices.
  - Dismantling of all construction services such as power line, sewage, water supply, communication system, etc.
  - Removal of all temporary roads, waste disposal areas, warehouse and outside storage area and all construction laydown areas and return ground to its original state or as prescribed in Environmental Plan.
  - Dismantling of the concrete batching plants, the warehouse, scaffoldings and other temporary facilities.
  - Dismantling of all temporary roads and accesses.
  - Returning the grounds to their original state as per the specifications included in the Environmental Plan.

15.12 BROWNFIELD CONSTRUCTION

The title can be Interfacing Plan / Management which covers the interface between;

- Different component
- Exsisting facilities
- Ongoing project by others
- *Future expansion project planned*

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"Brownfield" is the term used for extensions within an operating environment, where tie-ins are made to an existing operation. Work must take place in and around the operation and be integrated into the operational plant.

All Contractors and project team personnel are considered "guests" within the operating area and must agree to Nalcor "Safety Health and Environmental Requirements for Contractors" and perform with success H&S Training as well as any specific training required for a specific area for access to the premises, which are under the control of Nalcor operations. Construction work that takes place is generally disruptive to production activities and can pose a risk to operational performance if not correctly managed. The following will be evaluated with recommendations to

complete the coordination between the Project and Nalcor's Operating Team and minimize any disruptions or risks. They are:

- Tie-in to existing roads
- Tie-in to Churchill Falls
- Tie-in to Muskrat Tap Station
- Tie-in to Soldiers Pond
- Tie-in to SOBI

The various coordination works, permitting, access restrictions, lock-out procedures, etc., will be integrated into the contractual documents and will as such, become an integral part of the management by the Area concerned. The Area Coordinators and Supervisors together with the inspectors and H&S advisors will ensure the coordination with Operations and assure that the works Contractors proceed in accordance with the specific conditions of the work site.

15.12.1 Tie-in Procedures and Plans

During the Stage 3, construction will examine all above in conjunction with Engineering, the H&S and the Completions team to identify and confirm the application of the Tie-in, the Lock-out and Work Permit procedures as applicable to those various activities. They will be applicable to the various types of tie-in applicable such as roadwork, foundations, structural steel and cladding connections for building extensions, re-routing of and tie-in to existing service and process piping, addition of new equipment to existing operation systems, re-routing of and modification to existing electrical and instrumentation systems and control system linkages with existing systems.

Tie-in plans will be developed during the Feasibility Study period to present the lowest risk possible to plant operations. However, the final tie-in plans will have to be incorporated in the drawings and specifications prior to issue of the contract scope. Construction will then review the plans and the tie-in procedures to ensure that all eventualities are covered and that they are adapted to the requirements of the construction.

15.12.2 Construction Management Activities

Construction will liaise with Engineering to finalize the brownfield activities listed above and with H&S to identify the risks associated with each.

Construction will perform preliminary studies as applicable to above and concerning:

- Access to plant operating areas
- Heavy/ special lifts
- Movement of personnel and equipment in operating areas
- Construction vehicles and equipment flow in operational area

As part of the final Construction Execution Plan, the Site Construction Manager, together with H&S and construction services will include all conclusion in the final Construction Execution Plan.

New article may be Construction / contracting strategy and plan. Highlighting the decision bases of unite rate packages and LSTK packages. The role of SLI in managing different contract and the integrity of overall work execution.

15.13 MANAGING WORKS CONSTRUCTION-CONTRACTORS

15.13.1 Site Construction Manager

The site Construction Manager supported by a highly qualified and construction experienced Team is directly responsible for all aspects of construction. When a construction contract is awarded, he is appointed as the administrator of such contract. In turn, he delegates the Functional Manager or the area Construction Manager concerned. However, he remains directly responsible for all aspects of construction, including all of the functions described earlier and also all of the direct construction management and Contractors related to building all works of the project within all goals and Key Performance Indicators set forth for this project.

15.13.2 Area Construction Manager

The Area General Superintendent as delegated by the site Construction Manager is directly responsible for all aspects of the management of all works contracts within his area. In this regard, he reports directly to the site Construction Manager and functionally to the project Area Manager. He represents the single point responsibility and accountability for all works of the area. He represents also the single point of authority of all Contractors performing in the area.

He is directly responsible for all aspects of the contracts and construction of the works including:

- Supported by disciplined engineers who liaise functionally with the Site Resident Engineer and, where required, with QA/QC Manager, assurance that all drawings and specifications of contracts are the latest "issued for Construction", solution all queries of Contractors concerning drawings and specifications, decision on all non-conformances revealed by inspection or testing i.e. rejecting the work, accepting concession or recommending derogations.
- Supported by contract administrators, quantity surveyors and estimators, execute all aspects of contract administration as describe earlier.
- Supported by planners and schedulers and generally, PECC, general and micro planning of all activities of Contractors inside the area. In addition, the cost control requirement related to all contracts of the area.
- Construction of the works including supervision and coordination within the area and, when required, with adjacent areas or facilities.
- Mechanical completion of all contracts for easy handover to Completions.
- Support to Completions and Commissioning Teams.
- General administration and management of the deficiency lists for all contracts of the area.
- Ensure H&S completion by all Contractors within their area of responsibility.

15.13.3 Construction Supervision

The area Construction Manager is supported by Superintendents. They will liaise with the Area Engineers to assure that the works are built as per the drawings and specifications, and take all actions with the Area Engineers for all queries and solution of non-conformances. The QC inspectors deployed in the area check the details and the quality of the construction; they will liaise with the Construction Supervisor to assure that Contractors take all necessary actions where the case may be. H&S will assist to ensure H&S compliance.

15.13.4 Construction Superintendent

Because of the complexity of the construction within the areas, with several Contractors working on multiple works simultaneously, with several deliveries of major equipment to be installed, with the use of several heavy construction equipment of different nature, with deliveries of precast, pre-assembled or modular elements often of huge size, construction coordinators, reporting directly to the area Construction Manager.

The area Superintendent will provide the day-to-day coordination with the Contractor. He will liaise directly with all Area Contractors' Site Managers to plan the day work from each and the short vision. Typically, he will:

- Assure the best construction sequencing through the overall coordination between Contractors and their respective activities, precast, pre-assembly, material and equipment deliveries, etc.
- Coordinate between Contractor's activities.
- Hold the daily coordination meetings with the area supervision, engineering and inspection personnel and the Contractors to plan the day work and the short vision mentioned above.
- Coordinate the entire logistics of the area such as the delivery of heavy construction equipment, heavy precast or sub-assemblies.
- Coordinate the movement of material from the site warehouse on a JIT delivery to avoid congestion in the area.
- Coordinate the delivery of free issue materials to Contractors.
- Approve all gates passes for tools, equipment, materials, etc.

15.13.5 Construction Contracts and Contractors

Prequalification lists will be established in all disciplines including civil, concrete, structural steel, building mechanical and electrical, process mechanical, process electrical, instrumentation and specialties such as fire detection and protection, etc.

During the implementation of the Lower Churchill Project, Construction management will participate in the establishment of bidders lists prior to the bidding process, taking under consideration:

- Discipline capabilities and size
- Efficiency
- Quality performance
- H&S
- Volume of work versus the capacity of the selected Contractors on site and in the area and this, in line with the sponsorship problems mentioned before
- Quality and availability of Plant and Equipment, etc.

All bidders' lists will be approved by the Site Construction Manager. He will also participate in the approval of award process.

15.13.6 Contract Packaging

During Phase 4, Construction management will liaise with Engineering and Procurement to ascertain the validity and the implementation of changes to the project packaging.

The contract packaging will be determined as per the Contract dictionary developed in the Phase 3. However, during the implementation phase, in order to avoid unnecessary construction delays or for constructability or coordination reasons, Construction may intervene to recommend the splitting of certain packages. It is understood that such splits will be kept to a minimum. Consequently, tenders will be called with drawings and specifications at higher stage of readiness unlike a design-build situation.

Generally, the construction contracts will be prepared by disciplines such as site clearing, roadwork, mass excavation, earthworks, underground services, piling, concrete, tower foundation, tower erection, line stringing, steel erection, architectural and building services, mechanical, piping and electrical and instrumentation. This may vary as a result of the market conditions and the capability of the Contractors included in the pre-qualification lists. Construction will liaise with Procurement in all cases.

They will be of the types Lump Sum or Turnkey (T). These will be detailed within the Project Procurement Plan. Construction will review the scope and the details requested to Contractors to favour a sound contract administration during the implementation phase, particularly for the progress billing, the progress reporting, the estimation of site instructions or change orders, etc.

15.13.7 Constructability

The construction methodology, sequencing and contracting will be developed taking into consideration the experience gained during projects built worldwide with similar scope and technology. The construction methods may be improved using precast, pre-assemblies and modularization. After a full constructability review, additional improvements will be implemented.

Constructability plan to be added identifying who will leaded, when it should be implemented, and how the recommendation implemented in the packages.

Relation to change management need to be identified; Cost and schedule impact.

15.13.7.1 Partial Notice to Proceed (Early Works)

In order to ascertain the aggressive construction schedule, be responsible to implement early activities identified during the Phase 3 such as access roads, site offices, construction infrastructure, site amenities, construction labour camp, Contractors' laydown areas, storage areas and others.

In addition to the above and the usual Site Preparation, specific activities may be recommended as follows:

- Secure very early the source of backfill material, gravel, aggregates, cement, and relocate the batching plant facilities as required, etc.
- Start the construction of underground services very early not to interrupt the construction of the process buildings.
- Expedite the underground piping design very early; it is recommended that it be the first issue of engineering.
- Secure the use of a new construction jetty with Port Authorities at the very beginning of the Project implementation.
- Build a laydown area.
- Secure a construction road.
- Complete soil investigations as required.
- Construction of labour camp.
- Complete Topographic surveys as required.

15.14 PRECAST OF CONCRETE

In order to favour higher quality, fast erection and flexibility and to avoid congestion in the construction zone, several elements may be precast during the course of the project. More elaboration on where it will be applied and how to maintain quality control in engineering, fabrication, transportation and final assembly?

15.15 CONSTRUCTABILITY REVIEWS

A constructability review has been implemented as part of the Phase 3 to ensure that construction knowledge and experience gained on similar projects will be incorporated in the concept planning, design, engineering and procurement activities to assure an effective constructability of the project.

Constructability reviews will be conducted from time to time including construction sequencing to ensure that design, procurement and construction schedules interface in a logical sequence and that experience gained during execution is captured in a timely fashion to allow, if need be, early corrective measures.

15.16 MECHANICAL COMPLETION

Two different strategy depends on contracting strategyneeds to be illustrated;

1. Unit rates contract
2. LSTK contract
3. Interfaces with other packages
4. How we are going to maintain the whole facility integrity

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The Contractors' scope of work will include completion of all works up to and including mechanical completion, including testing and documentation as required by the contract specifications. In cases of Turnkey contracts, the Contractor will be fully responsible not only for mechanical completion but also for pre-commissioning and commissioning; in such cases, construction and Completions teams will assist and witness the activities.

The work included installation testing and may include also preparatory work for pre-commissioning by Completions Team or Commissioning by Operations as identified in the contracts.

The area Construction Manager, supported by the Area Supervisor, QC inspectors and the mechanical completion coordinator deployed from the Resident Engineer's office is responsible to manage the mechanical completion of systems/facilities in accordance with the Project schedule to enable Completions Team to commence its activities.

Generally, for ease of pre-commissioning and to take full advantage of the schedule sequencing, the mechanical completion will be pronounced by systems (blue tagging) that will then be handed over to Completions for further testing and pre-commissioning activities. Prior to pronouncing the mechanical completion of a given system, a list of deficiencies will be established for the Contractor's action. In the Key Performance Indicators, Construction management has targeted a goal of blue tagging with less than deficiencies.

In certain cases, Supplier engineers and representatives may be seconded to site so supervise installation, testing and commissioning of their equipment as may be required by the terms of their purchase order or contract. In such cases, they will advise and assist during construction system testing and continue with Completions system testing and commissioning.

The area Construction Manager is directly responsible for the transfer of the systems and eventually the facilities to Completions team and arrange the execution of the work required by the Completions team particularly with respect to works Contractors interfaces and in relation to safe access to equipment through well defined isolation, lockout and permitting systems where required as noted in the section “Brownfield”.

When all deficiencies are cleared and the systems are fully tested, the area Construction Manager will also be responsible for the full transfer of all systems and facilities to Completions along with all results of test, as-built drawings and O&M manuals.

16 PRE-OPERATIONAL VERIFICATION (COMPLETIONS)

16.1 SCOPE

Completions is defined as the activities taking place between the end of the construction activities defined as mechanical completion to the point where a system is handed over to the EOT for commissioning defined as practical completion, to enable to start-up and ramp–up to full production.

Completions convert all stages of verification and no-load testing for all equipments and components of a system in accordance with drawings and specifications. The work includes run-in operations to all permanent equipments and services, testing of controls and instrumentation and sequences under no-load conditions or “dry run”.

16.1.1 System Mechanical Completion

The completion of construction activities is achieved with mechanical completion which comprises:

- construction completed in accordance with the drawings and specifications;
- all tests and inspections completed in accordance with the specifications;
- completion of Vendor equipment construction checklists;
- continuity and meggar tests;
- leak and pressure tests;
- first fill of oils and lubricants;
- cold alignments;
- no deficiencies that have major safety implications or prevents the start of Completions activities; and

Completion of these activities on a system will signify mechanical completion thereby permitting the system to be “Blue Tagged”.

16.1.2 System Practical Completion

On completion of construction activities as defined by Mechanical Completion, Completions will commence with testing, which include:

- Verification al all emergency stops, protection settings and safety devices
- Control loop checks, no-load tuning, verification of interlocks and alarms
- Dry runs of process systems without feed and energization of services

- Functional testing in automatic mode and where applicable introduction of utilities
- Preparation of the handover package documentation

16.2 ORGANISATION AND APPLICATION

16.2.1 Application of SLI Completions

16.2.1.1 Engineering Phase

During the initial engineering design phase, the Completions team will perform the following activities:

- Define the systems on the P&IDs, PFDs and single line diagrams as the deliverables are made available from engineering.

A preliminary system list has been established during the FS. These systems are defined in the Project schedule.

- Prepare the Completions package dictionaries

The purpose of the Completions package dictionary is to provide a clear understanding of the completions boundaries, provide a system definition and identify the type of completions testing activities planned for the equipment within the system.

- Prepare an overall completions plan that follows the commissioning and plant start-up sequence in collaboration with EOT commissioning team.
- Provide input to Procurement for the correct allocation of Vendor assistance requirements for completions support. This includes durations, skills set required and approximate start and end dates.
- Develop a program with SLWP Procurement to attend the Factory Acceptance tests to maximize early testing, fault finding and rectification of equipment and systems before delivery to site.
- Set-up the SLI completions team.
- Prepare a plan, in cooperation with Construction, for the timely integration of completions activities with the completion of construction work.
- Prepare completions Procedures according to SLI completions scope of services, including forms and reports formats. A list of the completions procedures is provided in following table.

Table 16-1: Completions Procedure List

Title
Organisation
Completions Execution Plan
Facility / System Practical Completion handover to EOT
Construction / completions / Commissioning Interface and responsibility
Planning and Scheduling
Safety Lock-out/Tag-out
System scoping
Deficiency Management
Energization / Shutdown
Control and Management of Vendor's representatives at site
Work Authorization
System Mechanical Completion handover to completions
Completions Administration and reporting

- Obtain Completions and commissioning procedures, initial start-up, operation and maintenance instructions or manuals from Vendors/suppliers.
- Prepare Completions and Commissioning Check Lists forms/data sheets for the verification and testing of equipment and subsystems.
- Set-up equipment and system files for eventual handover for system commissioning or future operation of the facility.
- Evaluate required Completions testing equipment, supplies and tools and procure.
- Develop the Completions Management Database.

16.2.1.2 Construction Phase

During construction phase, the SLI Completions team will perform the following activities:

- Review the Completions master schedule and update.
- Purchase supplies and special tools required for testing and Completions activities as per scope.
- Coordination of Vendor testing requirements for Pre-Operational testing.
- Selections of Completions spare parts.
- Finalize scoped P&ID's and single line diagrams.
- Update the Completions Management Database
- Finalize Vendor requirements schedule and budget.
- Roll-out the testing responsibility matrix for Construction/Completions/EOT Commissioning activities.

- Follow-up on site construction progress as well as on the progress and results of verification and testing done by Construction. Receive reports, punch lists and lists of deficiencies, as applicable.
- Ensure all Construction testing procedures are developed and enforced with proper documentation for Mechanical Completion Handover.
- The role of quality control and preparation of Mechanical completion file which includes all FAT, Material certificated, Construction inspection reports, punchlist items and all required signatures for wettens tests and inspection.

16.2.1.3 Pre-operational verification phase

The Completions team will start to be involved on site when construction starts testing plant components (cables, instruments, equipment). This will be followed by verification and testing of complete systems by the Completions team. Completions will perform the following activities:

- Control of Safety Lock-out\Tag-out for systems handed over to Completions group by construction (blue tagged).
- Control systems I/O, functional and interlock testing.
- Ensure that installations have been constructed in accordance with approved drawings, design and construction specifications, flow diagrams and Vendor certified drawings.
- Progressive energization of all electrical and control system equipment and verification of all protections.
- Following energization of high voltage equipment, Completions will proceed with PLC/DCS, Electrical Switchgears and Motor Control Centers.
- Preparation of applicable redlined drawings for changes identified during Completions
- Coordination of blue tag and green tag walk downs with construction and operation. Blue tags are applied when the equipment is transferred from construction to Completions and green tags are applied when the systems are practically completed and accepted by Nalcor Commissioning.
- Coordination with Nalcor's personnel for systems handover and testing.
- Preparation and updating of deficiency lists.
- Completion of dry runs on process system and wet runs on service systems.
- Preparation and issuing of handover packages. As pre-operational verifications and tests of a system or sub-system are completed, handover packages will be prepared and forwarded to the Client's Commissioning team for reference during start-up. The handover package content will generally include the following:

- Updated deficiencies list
- Completions Package Dictionary
- Scoped drawings (P&IDs and Single Line Diagrams)
- List of equipment included in systems
- Equipment and system pre-operational test records (Test Data Sheets)
- Red-lined drawings
- List of Vendor manuals transferred
- Relevant Mechanical and Practical Completion Certificates

The Pre-operational verification phase culminates with the utility systems fully functional and with "DRY RUN" demonstration of the process systems prior to introduction of first feed by Nalcor's commissioning team.

Upon handover of a system, the responsibility transfers to Nalcor's commissioning team.

Article need to be added for handover documents for each system & sub-system. Those signed document are the bases of commissioning and start-up.

16.2.2 Completions Team Organization

A matrix-based Completions management organization based on the area management approach is proposed.

16.2.2.1 Completions Manager

SLI's Completions activities will be under the direction of the Completions Manager who will report to SLI's Project Manager.

The Completions Manager is responsible for the overall execution of the Pre-operational Verification (COMPLETIONS) Program and ensures all activities are performed in compliance with Completions and Project Procedures.

He will coordinate SLI's Completions testing activities with Nalcor's commissioning team.

16.2.2.2 Completions Area Manager

The Completions Area Manager as delegated by the Completions Manager is directly responsible for all aspects of the management of all Completions works within his area. In this regard, he reports directly to the Completions Manager and functionally

to the project Area Manager. He represents the single point responsibility and accountability for all works of the area.

16.2.2.3 Completions Resources

Completions resources will be derived from various sources; this includes SLI Completions testing engineers and/or technicians, Vendor representatives and labour supplied from Construction Contractors and manpower-supply Contractors.

- SLI Completions testing engineers and or technicians
  A multi-disciplined team consisting of mechanical, electrical, Instrumentation and Controls testing specialists will be assigned to each Completions Area Manager.
- Technical Services and Vendor Representatives
  All purchase packages and contracts, as appropriate, have provisions for the supply of technical services and Vendor representatives who will be scheduled to be on site at the appropriate time during construction, Completions process as required. Completions testing procedures will supply by the Vendors and form the basis of specific equipment testing requirements with verification and witnessing done by SLI Completions.
- Nalcor Operations and Maintenance trainees
  A number of Nalcor trainees will be seconded to SLI's Completions team until such time as their functions requires taking over facilities for commissioning.
- Workforce Provision
  Craft is required from the Contractors to support the Completions seam during testing. This shall be sourced from labour supplied by the Construction Contractors and to be managed by Completions.

16.3 COMPLETIONS TEST PROGRAM AND PROGRESS MONITORING

The test program will be detailed in the Completions package dictionary in accordance with the performance test requirements specified in the equipment or Vendor packages or using the generic Completions testing activities.

Working schedules will be prepared for the major systems identified. These system schedules will show in detail the sequence and duration of testing, test support, and interface activities.

Progress monitoring will schedule and monitor the progress from the start of the Completions system definition; through to Practical Completion acceptance by the Nalcor's commissioning team. Typical indicators to be used to monitor progress during Completions will include:

- Instrument calibrations
- Equipment energization from MCCs to PLCs
- I/O checks
- Electrical functional tests
- Driven equipment runs
- Functional Demonstrations

16.4 SAFETY

The Completions group will apply their specific safety procedures during the Completions stage. Before mechanical completion, the project construction safety procedures will apply. After practical completion, if any construction and/or Completions activities are required on the handed over system Nalcor's plant procedures are applicable. This will require that all persons entering or working in a zone and/or system under commissioning and start-up will require the necessary Nalcor safety training applicable to their area of work. This application should be reviewed during the Completions preparatory work period.

Areas handed over to Nalcor for commissioning will be fenced off from the adjacent construction areas.

16.5 FACTORY ACCEPTANCE AND OFF-SITE TESTING

When Factory Acceptance Tests are specified, they will in general be witnessed by the shop inspector, the package engineer, and other specialists as appropriate to the test, the EPT and Nalcor representative, as required. The test report will be signed off by those witnessing the test and forwarded for approval by the Area Engineer or Manager. Any deficient items that remain after the When Factory Acceptance Tests will be incorporated into the Completions system deficiencies database with reference to the report included in the Completions handover package. FAT coordination will be managed by a dedicated Manager.

16.6 OWNER PARTICIPATION

The Client commissioning team and plant operators will monitor and participate (where agreed) in the end stages of construction and the mechanical and practical completion activities as they familiarize themselves with the facilities and systems. During Completions and no-load testing they will witness and sign-off testing and calibrations on an “as required” basis.

After hand-over and acceptance of the Practical Completion Certificate (Green Tag) the Client commissioning team will assume responsibility for commissioning activities.

SLI are responsible for the contract administration of the applicable Contractors (related to the Completions system) ensuring deficiencies correction, remaining at the time of Practical Completion, expediting receipt of final as-builts and ensuring that the Contractor and or Vendor progresses towards the contractual requirements for commissioning (Turnkey Contractor only) and performance tests.

16.7 TESTING EQUIPMENT

Standard test equipment will be sourced in parallel with the Contractors and SLI Completions hand tools budget. Specialized tools will be sourced as part of the Vendor equipment supply packages or the specialized Contractor package.

16.8 CONSUMABLES AND SPARES PARTS

SLI Completions team is responsible to review and approve any Vendor suggested spares for installation and Completions. The ordering of spare parts will be then administered through SLI procurement. Further, spare parts lists will be reviewed by Nalcor’s Operation Team who will then place the order through Nalcor’s procurement system for all commissioning, two and five year operating spares.

16.9 DEFICIENCIES MANAGEMENT

A deficiency database will be used to track all project deficiencies from the official system walk downs (held prior to mechanical completion) to final system handover to the Client commissioning team.

All “work to be done” and or any deficient constructed items will be identified per tagged equipment based on P&IDs and associated equipment lists. Priorities will be assigned on the following basis:

- Priority “A”

  A priority of a deficiency is set to “A” when:

  – The deficiency is found prior to Mechanical Completion handover; and

  – the deficiency has major safety implication or the deficiency prevents the start of completion activities.

  – Mechanical completion cannot be done before these items are closed.

- Priority “B”

  A priority of a deficiency is set to “B” when:

  – The deficiency is found prior to Practical Completion Handover and it prevents the start of Commissioning activities.

  – Practical completion and handover to Nalcor cannot be completed before these items are closed.

- Priority “C”

  Indicate that the deficiency is valid and the work may be completed after Practical Completion handover.

- Priority “D”

  The deficiency is out of project scope.

17 COMMISSIONING AND START-UP

To be defined at a later date.

18 LICENSES AND PERMITS

18.1 SCOPE

This section of the Project Execution Plan outlines the permitting requirements for the construction of the project and the licenses to operate.

In essence, Nalcor is responsible for obtaining the necessary approvals, permits, licenses, and the like to construct and operate the facilities. However, while SLI will assist Nalcor by providing, assembling and presenting all supporting documents as well as the follow-up and the closure of all comments or concerns from various authorities.

18.2 ORGANIZATION

The permitting issues within SLI scope will be with the Environmental Manager.

To successfully fulfill this role; the Environmental Manager will be supported by Engineering, and Construction. In addition, a Permits Coordinator designated administrative assistants and document controllers will participate with the preparation of the permitting dossiers as well as their registration, transmission and follow-up through a dedicated file system of document control.

18.3 PERMIT STATUS

The Permit Status report developed during the project will be updated on a monthly basis during the execution phase.

Nalcor is responsible for this submission and to reply and address all potential comments from the Permitting Authorities.

SLI will support Nalcor for the preparation of the documents necessary to obtain permits approval during the construction phase.

18.3.1 Permitting Schedule

The Permitting Schedule developed during the project will be updated at the pre-construction stage, based on the following information.

- List of the facilities for each project area and the related engineering packages

- The packages execution schedule, including issued for bid and issued for construction dates
- Vendor Data Requirements for specific Turnkey and Purchase Order packages subject to permitting formalities

In principle, the Permitting Schedule will present the anticipated submission dates of various permit requirements as soon as the IFB or the Vendors documents become available, in order to secure the commencement of the construction activities of each facility as per the Project Master Schedule.

18.4 COMPLIANCE WITH PERMITS

The compliance with the various construction permit requirements will be monitored by SLI and audited by Nalcor.

19 LOCAL BENEFITS AND REPORTING

TBD

20 PROJECT CLOSEOUT EXECUTION PLAN

Project closeout requirements are detailed in the individual department project procedures. In general, each department and Functional Manager will be responsible for ensuring that his/her files are complete and archived, both in hard copy and electronically, in a clear and logical manner.

This section of the PEP highlights key issues for closeouts and the preparation of the Project Closeout Report.

20.1 ENGINEERING

The following documents and deliverables will be reviewed, updated as required and issued to Client:

- Basic engineering data and process documentation
- Standard engineering specifications
- Design calculations notes
- Equipment List and Electrical cable and instrument index; Certified Vendor drawings and data. Drawings will be updated with Vendor approved modifications, if any, after commissioning
- 3D model will be as-built to show dimensionally correct representations of equipment in their correct location; Construction drawings (2D) will be updated to “as-built” status
- Hazard evaluations studies (HES)
- Transfer of all associated electronic files and databases to Client (SPF)

In addition, the following WorkflowGen processes will be closed out appropriately and relevant documentation will be handed over to Client:

- All pending DCNs, TQs and SEQs
- All RMPs and PO closeout related items

20.2 PROCUREMENT AND MATERIAL CONTROL

Purchase order and contract closeout includes:

- Verification of the completion of Vendor (Pos and TKs) issued documentation including certified drawings, manuals and test reports, certificates and history dockets

- Verification of the completion of deliveries from Vendors including spare parts
- Formal transfer to Client of all equipment and parts remaining in SLI warehouse and laydown
- Resolution of Over, Short and Damage (OS&D) reports
- Settlement of all variations and back charges
- Release of holdbacks, guarantees and bonds upon issuance of completion certificates
- Receipt of site issued acceptance and handover certificates
- Handover of PO, TK or contract file complete with the original purchase order or contract and any approved variances, correspondence, inspection and expediting reports, material certificates, shipment releases, shipment reception sheets, custom clearances and warranty certificates
- Return certificates of compliance confirming destruction of Client Confidential Technology documents

20.3 CONSTRUCTION

Construction closeout is a step process beginning with the issue of completion certificates to Contractors and handover certificates to Nalcor's Commissioning Group.

Contractors' completion includes:

- Correction of deficiencies
- Handover of "as-built" and approved Red Lined Documents
- Completion of construction tests and acceptance of test documentation by SLI

Contract closeout comprises:

- Receipt of construction completion certificate
- Final reconciliation of owner supplied materials and return of surplus material
- Receipt of the Hand over and Acceptance Certificate from the Client Commissioning Team
- Verification of the completeness of Contractor issued documentation including test documentation and as-built drawings
- Settlement of all variations and back charges
- Release of holdbacks, guaranties and bonds
- Handover of contracts file including correspondence, approved contract modifications, contract documents and completion certificates to procurement for filing

20.4 PRE-OPERATIONAL VERIFICATION

The closeout process begins with the handover of the mechanical completion certificate for the system, subsystem, or facility to the Client Commissioning Team.

The documentation includes:

- List of corrected deficiencies
- List of any outstanding items (deficiencies which have been accepted by Client)
- Results of COMPLETIONS and no load tests
- Handover of marked up documentation (Vendor, Contractor, SLI)
- Handover of “As Pre-commissioned” Red Lined Documents

20.5 PROJECT CONTROLS

Transfer of following Project documentation to Client:

- Document control database
- Project milestone schedule with planned and actual dates
- Final project cost reports
- Asset register

20.6 FINANCE AND ACCOUNTING

Summary of project information up until closeout including asset registers.

20.7 PROJECT ADMINISTRATION

Issue of a project closeout report summarizing the project scope, achieved schedule and final cost forecasts.

Details of the Project Closeout Report are given in Section 20.16 of this document.

20.8 IT AND AUTOMATION

Removal of all proprietary SLI software and data from owner supplied hardware and software.

Handover of ongoing project electronic data management systems as per SLI contract agreement.

Handover of owner supplied hardware and software as per SLI contract agreement.

20.9 RISK MANAGEMENT

Transfer of remaining risk ownerships to Nalcor's team.

20.10 QUALITY ASSURANCE AND CONTROL

Assemble and archive the updated QA plan together with a book of QA audit reports.

20.11 HEALTH AND SAFETY

Prepare and issue the final project H&S statistics report.

20.12 ENVIRONMENT

Prepare and issue the final project Environment statistics report.

20.13 LOCAL BENEFITS

Prepare and issue the final project Local Benefits statistics report.

20.14 PERMITTING

Compile the list of permits obtained and disposition, transfers of custody of any remaining issues to Client.

20.15 INDUSTRIAL RELATIONS AND HUMAN RESOURCES

Prepare summary report of industrial relations (IR) issues during the project.

20.16 PROJECT COMPLETION REPORT

20.16.1 Purpose of the Report

The report will provide a record of the delivery of EPCM services by SLI for the project.

The report will describe management, engineering, procurement, construction and pre-commissioning executed by SLI and includes a set of appendices covering the major management structures, schedules, reports and engineering information used to execute the services stipulated in the EPCM contract signed between SLI and the owner, Nalcor.

The report will provide a factual account of the project, costs, schedules, major quantitative summary of SLI's deliverables, man-hours, performance, and expenditure.

20.16.2 Project Fact Sheet

At completion of the project, the Project Manager shall update the project fact sheet.

20.16.3 Lessons Learned

At completion of the project, the Quality Manager shall prepare and review the Lessons Learned with Divisional Management personnel.

APPENDIX A

Responsibility Assignment Matrix

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Project Management / General			
Prepare Overarching Project Execution Plan	R		
Establish / Implement Project-wide Policies	R		EPCM Consultant to input as appropriate.
Project Management Plans and Associated Procedures	R	R	2 sets - Nalcor and EPCM Contractor
Project Execution Plan for EPCM Services Scope		R	
Prepare / Implement Project Procedures for within EPCM Services Scope)		R	
Prepare Technical Interface Management Plan		R	
Overall Technical Interface Management for EPCM Project		R	
Prepare Deliverable List & EPCM Work Packages		R	
Approval of EPCM Personnel	R		Reimbursable personnel only.
Recruitment & Training of Operations Staff	R		EPCM to support training
Health, Safety and Security Management			
Develop and implement a Project-specific H&S Management Plan for all phases of the work		R	Within EPCM's scope.
Chairs Project-level OHS Steering Committee	R		
Monitors contractor / sub-contractor performance and coaches to achieve desired outcomes		R	
Develop and implement site-specific H&S Management Plans		R	
Establish supporting H&S procedure, processes & tools for the H&S Plan.		R	
Prepare and implement Emergency Preparedness/Response Plans		R	
Develop & Implement Security Plan and Procedures		R	
Compliance with Occupational Health and Safety Act and Safety Requirements		R	
Monitor Safety Performance and Prepare Safety Statistics Reports		R	
Establish construction safety targets		R	
Investigate and report Accidents and Near Misses		R	
Site Safety Inductions		R	
Verifying Contractor Safety Management Systems and site safety plans		R	
Implement a Safety-By-Design program to support the Engineering phase		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		NOTES
	Nalcor Energy	SNC-Lavalin	
Environmental Management and Regulatory Compliance			
Obtain Environmental Release	R		
Develop a Project-Wide Environmental Protection Plan for all phases of the work		R	
Develop and implement environmental mitigations and rehabilitation plan for use during and post the construction phase		R	
Monitors contractor compliance with EPP		R	
Obtain and manage all construction permits, licenses, notifications and maintain conditions.		R	Constructor will be responsible for individual permits. Nalcor will also liaise with regulators and obtain permits
Establish construction environmental management targets		R	
Develop Site Specific EPPs		R	Contractor will be responsible for developing site specific EPPs and SLI will approve them
Prepare and implement Project Regulatory Compliance Plan		R	
Identify requirements and complete applications for permits and licenses		R	Permits in Nalcor's name.
Compliance with applicable Environment Regulations and Conditions of Permits		R	
Environmental Awareness Training		R	
Verify Contractor Environmental Management Systems and EPPs		R	
Environment Management Committee	R		
Labor and HR Management			
Establish Project Labor Agreement (incl. Special Project Order)	R		EPCM supports negotiations and implements.
Overall management of Project labor agreements used by Contractors.		R	
Administer dispute resolution mechanisms outlined in Project labor agreement.		R	
Overall labor management includes productivity and performance.		R	
Administer of policies and procedures related to Personnel on site.		R	
Project Human Resources Policies	R		
External and Public Relations / Communications			
Project Press Releases	R		
Project Presentations	R		EPCM Consultant delivers presentations as approved by Nalcor.
Agreements with Outside Authorities			
• Government	R		

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
• Public Affairs	R		
• Community	R		
Manage Environmental Assessment Commitments	R		EPCM to execute commitments.
Property Assessment and Acquisition	R		
Innu Nation IBA Commitments	R		EPCM to execute commitments.
Reviews and Audits			
Project Audits			
• General Technical		R	
• Project-Level/Financial	R		
• Management		R	
• Environmental		R	
Prepare Design Verification Plan		R	
Independent Project Reviews	R		
Constructability Reviews		R	
Operability Reviews	R		
Technical Peer Reviews		R	
Engineering and Design			
Establish and maintain Project Basis of Design	R		
Establish Design Philosophies	R		
Prepare Review Plan for Company Supplied Documentation		R	
Engineering Management Plan for EPCM Scope		R	
Develop Engineering Procedures for each discipline		R	
Develop Design Integrity Stewardship Procedures	R		
Identify Design Codes and Standards		R	
Identify all engineering deliverables for each discipline		R	
Estimate a Person-hour effort for production of engineering deliverables		R	
Prepare Design Briefs & Criteria		R	
Prepare Technical and Functional Specifications		R	
Implement a Value Improving Practices (VIP) program as a means to improve cost, schedule and operability/reliability		R	
Equipment Spec/Data Sheets/Evaluation/MOC, Drawings - All Disciplines		R	
Preparation of all tender drawings		R	
Prepare any Technical Specifications for Tenders		R	
Manage all hard and soft technical interfaces within and touching the EPCM scope		R	
Perform Interdisciplinary checks on all engineering		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
deliverables			
Prepare Construction Drawings		R	Except contractor or supplier furbished
Prepare Operations and Maintenance Plan		R	
Prepare Design - Construction Management Plan		R	
Conduct design in accordance to Company-supplied Life Cycle Cost Analysis Philosophy		R	
Arrange and coordinate HAZID and HAZOP reviews		R	
Perform Safety Integrity Level (SIL) studies as required		R	
Detailed Technical Studies		R	
Overall System Engineering and Integration Studies		R	
Complete Equipment Criticality Ranking for use in determining surveillance		R	
Technical Bid Analysis		R	
Technical Review of Contractor Shop Drawings		R	
Equipment Model Testing		R	
Ensure equipment Installation Procedures are available		R	
Automation, Control, Monitoring, Remote Operation		R	
Review of Construction Contractor's Drawings		R	
Supply Chain Management			
Contracting and Procurement			
Establish Master Contract Package List and Contracting Strategy		R	
Prepare Contracts/Purchasing Policies	R		EPCM implements
Prepare Overall Purchasing Plan		R	
Prepare Overall Contracting Plan		R	
Prepare and implement Contracts/Purchasing Procedures		R	
Define Construction/Procurement Packages		R	
Establish standard Commercial Terms and Conditions for agreements	R		
Special and Supplementary Conditions - Inquiry Document	R		
Develop procurement and contracting schedule including Delivery Schedule (ROS Dates)		R	
Data Submittal Schedule		R	
Prepare list of qualified Bidders		R	
Prepare and Issue EOI &Pre-Qualifying Documents		R	
Prepare and issue tender / RFP packages		R	
Respond to Clarification from Bidders		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Receive Bids/Opening		R	
Commercial and Technical Evaluations of Tenders		R	
Conduct pre-award meetings		R	
Contract/Purchase Requisition		R	
Issue Purchase Order (PO)/Contract		R	
Contract/Purchase Order Register		R	
Status of Purchase Orders/Contract		R	
Contract/Purchase Order Amendments		R	
Contractor Competency Evaluations		R	
Claims Management		R	
Dispute Resolution		R	
Close Out PO/Contracts		R	
Materials Management and Control			
Material Management Plan		R	
Produce Detail Material Management Control Procedures/Plans		R	
Provide and maintain Material Management Control System		R	
Report Progress and Update Regularly		R	
Establish a Site Materials Storage Area		R	
Schedule Deliveries to Site		R	
Perform receiving inspection		R	
Establish and Maintain Material Receipts Register		R	
Distribute Equipment and Material to Contractors		R	
Report and manage non-conforming material		R	
Carry Out Regular Inventory Checks		R	
Procure and maintain Commissioning Spares		R	
Procure and maintain Operating Spares	R		
Warehousing of Spares		R	
Secure Vendor Commissioning Assistance		R	
Transfer Insurance and Operating Spares to Owner's Warehouse		R	
Stored Equipment Maintenance & Preservation		R	
Expediting			
Expediting and Inspection Procedures		R	
Expediting Visit Register		R	
Vendor Information		R	
Equipment and bulk materials		R	
Status Reporting		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Logisitics			
Develop Logistics and Materials Movement Plan		R	
Develop Logistics and Materials Movement Procedures		R	
Coordinate Inland Freight		R	
Obtain shipping documents		R	
Coordinate Ocean Freight		R	
Prepare Customs Documents for importing into Canada		R	
Prepare shipping data for export		R	
Operating Plant Logistics Planning	R		
Construction Management			
Prepare and implement Construction Management Plan		R	
Overall construction management for the Project		R	
Construction Planning		R	
Develop and Implement Construction Management Procedures		R	
Complete modularization / prefabrication analysis		R	
Prepare Detailed Construction Execution Plan & Schedule		R	
Manage Site Queries		R	
Engineering Query Process		R	
Manage Owner supplied materials		R	
Develop and implement Constructability Program and supporting procedures in order to incorporate industry best practice		R	
Carry Out Constructability Design Reviews		R	
Develop and implement a Productivity Improvement Plan		R	
Overall management of Project sites and provision of common services (e.g. accommodations, fire, security, transportation, etc.)		R	
Provision of Temporary Facilities at Site including Construction Office		R	For EPCM and NE-LCP team.
Provide Services to Offices		R	
Provision of Site Administration Services and Accommodations / Messing		R	
Establish and maintain Fire Protection and Medical Facilities and Services		R	
Provide Suitable access and lay down / storage areas to allow contractors to mobilize		R	
Reports/Communication External to Project Team	R		
Relocations of Services and Site Clearing		R	
Overall work site coordinator		R	
Control of the Work and Contractors.		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Contractor Performance Monitoring		R	
Productivity Monitoring and Improvement		R	
Managing and Checking the setting out of the works on site including control survey		R	
Liaison with Contractors to determine material/equipment requirements and expediting from field where necessary		R	
Procure, administer, maintain all construction equipment, consumables, small tools, safety supply		R	Monitors contractors
Provide site communications - backbone system	R		
Provide construction power feed to site	R		
Provide Site Transport (to and from the site and within the site)		R	
Construction Power - Site Distribution		R	
Provide site communications - Local system		R	
Establish and maintain Warranty Register		R	
Project Completions			
Prepare Project Completions Philosophy		R	
Prepare Mechanical Completion (MC), Commissioning, and Preservation Specifications		R	
Prepare project-specific procedures for punch-list, preservation, permit-to-work, lock-out/tag-out, material handling		R	
Establish and implement a computerized Project Completion System		R	
Mechanical Completion (MC) - Manual, Execution / Management		R	Monitors contractors
Prepare Commissioning Manual		R	
Develop preservation program		R	
System / Equipment Preservation - Manual, Execution / Management		R	
Mechanical Completion Hand-Over Plan & Execution		R	
Prepare Handover Packages after Mechanical Completion		R	
Prepare M/C Inspection Test Records		R	
Prepare Mechanical Completion Certificate		R	
Prepare Commissioning Plan		R	
Readiness Process - define and implement	R		
Prepare and Update Pre-Op Schedule	R		
Commissioning Procedures		R	
Prepare commissioning static and dynamic documentation (e.g. checklist, run logs, etc.)		R	
Commissioning Spares Recommendation		R	
Prepare Testing Requirements, Procedures and Check Lists	R		

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
RFO Turnover Packages	R		
Arrange for Equipment Data Books, Operating and Maintenance Manuals to be supplied		R	
Hand-Over As-Built Drawings after Acceptance Tests		R	
Arrange for Contractors or Consultants to provide Commissioning Services		R	
Spare Parts Recommendation		R	
Prepare Spare Parts Lists		R	
Arrange for the provision of the necessary spare and replacement parts for initial Operation	R		
Prepare / maintain Master Equipment List		R	
Prepare Training Manuals		R	
Prepare Operations Procedures	R		
Prepare Operating Manuals		R	
Prepare Maintenance Manuals		R	
Prepare As-Built Documentation		R	
Quality Management			
Prepare Overarching Project Quality Assurance Plan	R		
Prepare and implement Project Quality Plan		R	Nalcor to audit implement.
Develop risk-based contractor / supplier screening tools for use in determining surveillance requirements		R	
General Quality Audits	R		
EPCM / Contractors Audit Function		R	NE will approve / accept the Contractors Audit Process
Develop and implement NCR Process		R	NE will approve / accept the Contractors NCR Process
Closure of Audit Findings		R	
Continuous Improvement Process		R	
Assess Contractors Quality Plans		R	
Overall Quality Statistics / Metrics		R	
Quality Training		R	
Lessons Learned		R	EPCM responsible for its scope.
In Engineering			
Development and implement engineering QA plan		R	
Engineering QC process		R	
Engineering Quality Reviews		R	
In SCM			
Risk-Based evaluation of suppliers / contractors for surveillance program development		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Prequalification - Establish Quality requirements		R	
Prequalification - Establish Quality requirements		R	
RFP - Quality Requirements		R	
Third Party Inspection		R	
Materials Traceability		R	
In Construction			
Overall responsibility for construction quality		R	
Contractor adherence to codes and regulations		R	
Establish site survey control system and control points		R	
Processing of Site NCR's		R	
Producing Construction Surveillance Reports		R	
Receiving Inspection at Site		R	
Prepare and implement Inspection Policies		R	
Prepare and implement Inspection Work Plan		R	
Review Quality Assurance (QA) programs/inspections		R	
Review of Vendors ITP's for equipment		R	
Conduct Shop Inspections		R	
Coordinate Factory Acceptance Testing and Site Integration Testing		R	
Develop FAT and SIT procedures		R	
Witness Shop Performance Testing		R	
Establish and operate site laboratories		R	
Review Vendor's Inspection and Testing Reports		R	
Status Reporting		R	
Endorse equipment Release for Shipment		R	
Project Control			
Establish and manage Management Summary Schedule (MSS)	R		Overall Project
Establish and manage Integrated Project Schedule (IPS)	R		Overall Project
Develop Project Controls Work Plan		R	For EPCM scope
Business Systems Integration	R		EPCM runs its PM tools (i.e. PM+)
Develop Work Breakdown Structure(WBS) & Cost Code of Accounts	R		
Progress and Performance Management		R	
Planning & Scheduling		R	
Progress Reports			
• Overall Project	R		
• EPCM Scope		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Estimating			
Estimating Work Plan & Procedures		R	
Prepare Services Budget Estimate		R	
Prepare Cost Estimates for the Work		R	
Assign Coding System		R	
Equipment and Material List		R	
Prepare Basis of Estimate		R	
Develop Material Quantities (bulks and consumables)		R	
Develop Equipment and Material Supply Cost (rates)		R	
Develop Labor Rates for use in estimating	R		
Develop production norms / rates to be used in the estimate		R	
Prepare Capital Estimate of Direct Costs and Matrix Summaries	R		
Develop Construction Hours including Productivity Factor	R		
Establish Estimate Contingency	R		
Contingency Management	R		
Capital Cost Estimate Details and Matrix Summaries	R		
Prepare estimates for Project Changes		R	
Check Bid Estimates for Construction Contracts		R	
Operating Cost Estimate	R		
Planning and Scheduling			
Manage EPCM Services to achieve Project Milestone Schedule		R	For EPCM Scope
Prepare Scheduling Development and Control Plan		R	For EPCM Scope
Implement Scheduling Development and Control Plan		R	For EPCM Scope
Develop Scheduling Procedures		R	For EPCM Scope
Prepare detailed Project Control Schedule and updates		R	For EPCM Scope
Prepare detailed schedule of Engineering Activities by work Package		R	For EPCM Scope
Prepare detailed schedule of Equipment Procurement by Package		R	For EPCM Scope
Prepare detailed Construction Schedules and updates		R	For EPCM Scope
Prepare schedules showing sequence and timing for individual Contracts		R	For EPCM Scope
Prepare work hour histograms and "S" curves		R	For EPCM Scope
Cost and Schedule Stewardship			
Convert EPCM Consultant's Services Budget and Sanction Cost Estimate into a Project Budget		R	For EPCM Scope
Prepare Cost Management Plan		R	For EPCM Scope
Implement Cost Management Plan		R	For EPCM Scope

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Develop forms and Procedures for Capital Cost Control		R	For EPCM Scope
Develop Progress and performance management procedures		R	For EPCM Scope
Code of Accounts for Asset Classification and Capitalization	R		
Cost Control for the Work		R	For EPCM Scope
Maintain and update EPCM Budget		R	For EPCM Scope
Allocate funds for Contract Change Orders	R		
Receipt and review of contractor cost reports		R	For EPCM Scope
Prepare monthly Project Cost Report		R	For EPCM Scope
Management of Change			
Prepare Change Management Plan for EPCM Project		R	
Management of Change within EPCM Services		R	
Engineering / Design Change Management		R	Using EPCM's process, linked to Project MOC process.
Maintain the individual Contract Scope Change Register		R	
Accounting & Invoicing			
Prepare Invoicing and Payment Plan for construction contracts and supply agreements		R	
Establish a Project Bank Account to Disburse all Payments	R		
Attest invoices from Vendors/Contractors		R	
Issuing Payments	R		
Submit detailed invoice progress payment listing complete with reconciled order status as stipulated in the purchase order		R	
Final Plan Cost Reconciliation and Closeout Report		R	
Maintain a comprehensive Accounting service to maintain a full set of books of Accounts in accordance with General Accepted Accounting Practice for the entire Project Cost through to Balance Sheet	R		
Annual Audit of Project Accounts	R		
Prepare and maintain a comprehensive Assets Register which reconciles with the total Project expenditure	R		
Cash Management	R		
Maintain Payment Ledger	R		
Develop Currency Management Strategy	R		
Prepare monthly Cash Flow Report		R	
Prepare Certificates of Payments		R	
Forecasts for Cash Flow demand and foreign currency requirements		R	
Project Tax Management	R		

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Risk Management			
Prepare Risk Management Plan for scope within EPCM Services		R	
Approval of Contractor Risk Management Plans		R	Dependent upon contract form.
Project Risk Assessments		R	Within EPCM scope
Management of Tactical Risks		R	Within EPCM scope. Nalcor approves plans.
Management of Strategic Risks	R		Project wide.
Establish Project Insurance Program	R		Project wide.
Information Management			
Prepare Information Management Plan		R	
IS/IT			
Infrastructure integration of Business Systems, if required	R	R	Requirements to be determined.
IT Infrastructure Contractor Offices/sites.		R	
Hardware/Software for NE-LCP team members located at Contractor offices/sites.		R	
Help Desk Support for NE-LCP team members located in Contractor offices/sites.		R	
Document Management			
Management of Engineering data and documents.		R	
Management of Vendor data and documentation.		R	
Management of Contractor data and documentation		R	
Provide Company with on-line / electronic access to key documentation		R	
Project Information Coding	R		EPCM Implements
Document /Data Standards (formatting)	R		EPCM Implements
Signing, stamping and sealing of Engineering documents		R	
Document Review Coordination		R	
Provision and use of existing project data/documentation	R		EPCM Utilizes
Deliverables List Submission Timing Matrix		R	
Prepare Final Documentation		R	
Deliverables Handover/Retention Matrix		R	
Benefits and Training			
Adhering to Nalcor/LCP hiring adjacency protocol and commitments from other agreements		R	
Meeting Participation Nalcor/LCP objectives with respect to underrepresented groups		R	

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	SNC-Lavalin	NOTES
Developing and Delivering Training, orientations and apprenticeship programs			Apprenticeship Programs require Input by EPCM
Encouraging relevant stakeholder groups to access and develop training opportunities	R		
Providing manufacturers, consultants, contractors, and service companies in Newfoundland and Labrador with full and fair opportunity to participate on a competitive basis in the supply of goods and services		R	
Developing and Implementing supplier development Initiatives		R	
Implementing Diversity plan and Diversity Commitments as per other Agreements		R	
Carrying out consultant and contractor proposed programs in Newfoundland and Labrador to promote education, technology transfer and research and development		R	
Collecting and reporting Relevant Benefits Data as per Nalcor/LCP Benefits Criteria		R	
Defining and Executing commitments based on Nalcor/LCP Benefits Strategy and other agreements		R	

APPENDIX B

Environmental Policy & Guiding Principles

ENVIRONMENTAL POLICY AND GUIDING PRINCIPLES

All Nalcor Energy companies will help sustain a diverse and healthy environment for present and future Newfoundlanders and Labradorians by maintaining a high standard of environmental responsibility and performance through the implementation of a comprehensive environmental management system.

The environmental principles that follow guide Nalcor Energy companies' environmental actions and decision-making:

Prevention of Pollution

- Implement reasonable actions for prevention of pollution of air, water and soil and minimize the impact of any pollution which is accidental or unavoidable;
- Use the Province's natural resources in a wise and efficient manner;
- Use energy as efficiently as possible during the generation, transmission, and distribution of electricity, and the operation of its facilities, and promote efficient use of electricity by stakeholders;
- Maintain an adequate level of emergency preparedness in order to respond quickly and effectively to environmental emergencies, and
- Recover, reduce, reuse, and recycle waste materials whenever feasible.

Improve Continually

- Audit facilities to assess potential environmental risks and to identify opportunities for continual improvement of environmental performance;
- Establish environmental objectives and targets, and monitor environmental performance;
- Integrate environmental consideration into decision-making processes at all levels; and
- Empower employees to be responsible for the environmental aspects of their jobs and ensure that they have the skills and knowledge necessary to conduct their work in an environmentally responsible manner.

Comply with Legislation

- Comply with all applicable environmental laws and regulations, and participate in the Canadian Electricity Association's Sustainable Electricity Program;
- Periodically report to the Board of Directors, Leadership Team, employees, government agencies, and the general public on environmental performance, commitments and activities.
- Monitor compliance with environmental laws and regulations, and quantity predicted environmental impacts of selected activities and the environment; and
- Respect the cultural heritage of the people of the Province and strive to minimize the potential impact of Corporate activities on heritage resources.

Approved by:

Date: February 3, 2010

Version: 3

nalcor energy

SNC·LAVALIN

ENVIRONMENTAL POLICY

SNC-Lavalin Group Inc. and its subsidiaries ("SNC-Lavalin"), an engineering, construction and manufacturing firm operating worldwide, affirms its conviction that sustainable development can only be achieved through the respectful use of natural resources.

SNC-Lavalin is committed to preventing pollution and continuously improving the integration of environmental protection issues into all its activities and those of its clients, both in Canada and abroad.

As part of its commitment, SNC-Lavalin will ensure that all of its activities are in compliance with applicable environmental laws and regulations.

SNC-Lavalin will raise the awareness of its employees and its employees and its project managers so that environmental protection is an integral part of their activities. Project managers will produce reports stating that their projects have been executed in compliance with this environmental policy.

This policy will be communicated to all employees and made available to the public upon request.

The President and Chief Executive Officer of SNC-Lavalin is responsible for implementing and monitoring this policy. All employees and outside consultants working for SNC-Lavalin must share this commitment.

Pierre Duhaime
President and Chief Executive Officer
SNC-Lavalin Group Inc.
June 16, 2009