

**SCOPE OF WORK AND TECHNICAL ATTACHMENTS**

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**1.0 Introduction**

**1.1 General**

Company currently plans to manage the development phase of the Lower Churchill Project utilizing a Company led, fully integrated project management team. The team will consist of Company personnel, personnel supplied under the Engineering Design and Project Support Agreement, and other personnel / consultants employed by Company. The project management team will be responsible for delivery of all Engineering, Procurement, and Construction Management (EPCM) functions, to the degree dictated by the Project's Execution Strategy, required to complete the Lower Churchill Project development phase.

While Company contemplates using a Company led integrated project management team model, Consultant may include, as an alternative, other proposed project delivery models for consideration by Company.

Figure 1 below provides an overview of the project management team model contemplated to manage the development phase of the Lower Churchill Project.

**Main Interactions and Interfaces to Produce and Manage PO's and Contracts**

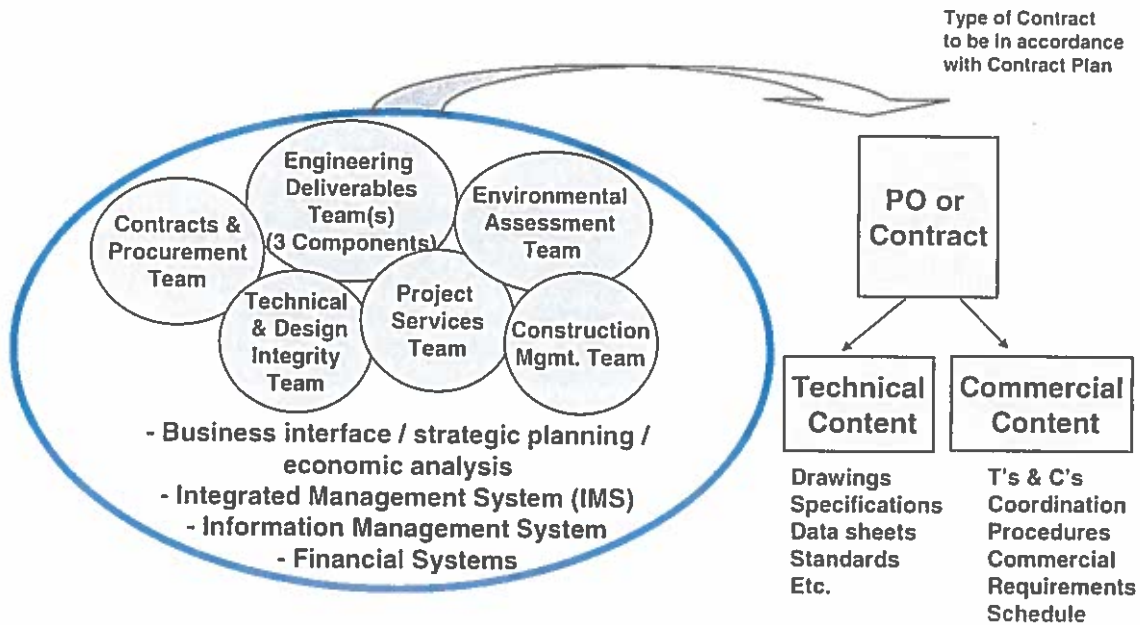


Figure 1 –Project Management Team Model

**1.2 Company’s Project Gateway Process**

The overarching project execution process for the Lower Churchill Project is the Gateway Process depicted in Figure 2 below. The scope of work to be performed under the Engineering Design and Project Support Agreement will span from start of Phase 3 through Phase 4 and extending to start of operations.

**Gateway Process**

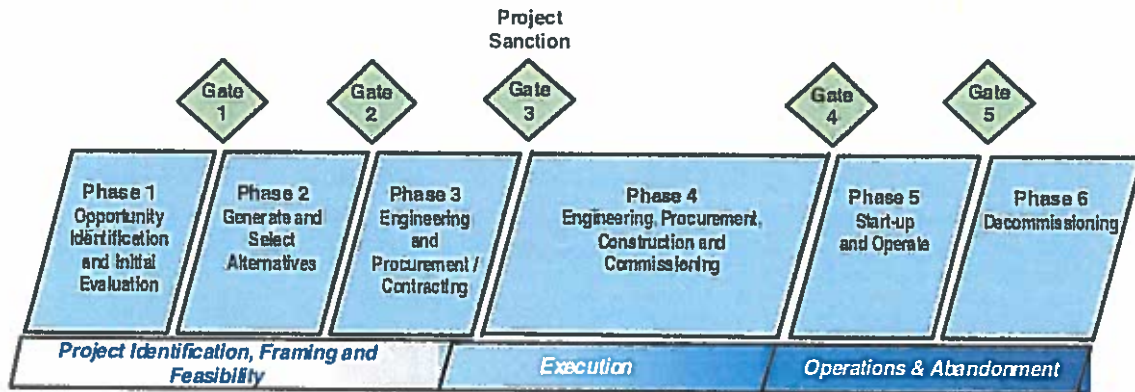


Figure 2 – Lower Churchill Project Gateway Process

**1.3 Project Framing and Scopes of Work under Engineering Design and Project Support Agreement**

**1.3.1 Scopes of Work A, B & C:**

For project management purposes, and for the purpose of obtaining engineering-specific services under the Engineering Design and Project Support Agreement, the Lower Churchill Project is broken down into three (3) discrete physical project components as follows:

- Component A: Gull Island Hydroelectric Development
- Component B: High Voltage Direct Current Transmission System Specialties
- Component C: High Voltage Overhead Transmission Lines (ac and dc)

Scopes of Work A, B and C under the Engineering Design and Project Support Agreement are as follows:

- Scope of Work A:** Provision of engineering-specific services for Component A.
- Scope of Work B:** Provision of engineering-specific services for Component B.
- Scope of Work C:** Provision of engineering-specific services for Component C.

The detailed physical descriptions of each of the noted project components A, B and C, and the associated engineering-specific scopes of work applicable to the Engineering Design and Project Support Agreement are included in Sections 2.0, 3.0 and 4.0 of this document.

### 1.3.2 Scope of Work D:

In addition to the provision of engineering-specific services applicable to physical Components A, B and C, other personnel may be provided under the Engineering Design and Project Support Agreement to bolster the Company led project management team. This scope will be referred to as:

**Scope of Work D:** Provision of Support Personnel

The detailed description of the requirements associated with Scope of Work D is included in Section 5.0 of this document.

## 1.4 Contract Packages

A complete listing of the anticipated contract packages associated with the Lower Churchill Project, complete with the proposed contracting strategy, is included in Attachment A to this Scope of Work and Technical Attachments. Contracting and procurement activities will be undertaken by the project management team on Company paper.

## 1.5 Muskrat Falls Hydroelectric Development

Work associated with development of the Muskrat Falls Hydroelectric Development is not included in the scope for the Engineering Design and Project Support Agreement. Company reserves the right to extend the Engineering Design and Project Support Agreement to include the Muskrat Falls Development should Company decide to proceed with that development.

## 1.6 Office Location

Company intends to establish a main project office in St. John's, Newfoundland. It is expected that Company's project office will initially house the entire project management team including personnel provided under the Engineering Design and Project Support Agreement. Accordingly, it is intended that the engineering-specific scope of work to be performed under the Engineering Design and Project Support Agreement will be carried out in Company's main project office.

As the project moves into the Execution Phase (Phase 4 - refer to Figure 2) Company will maintain the main project office. In addition, Company will establish site offices which will house portions of the project management team as required to meet the project requirements. Site offices will include offices at the various construction sites throughout the Province of Newfoundland and Labrador as well as offices located in various vendor facilities.

## 1.7 Acronyms

ac	alternating current
CADD	Computer-Aided Design
CF	Churchill Falls Hydroelectric Facility
CFRD	Concrete Faced Rockfill Dam
dc	direct current
EPC	Engineering, Procurement and Construction
EPCM	Engineering, Procurement and Construction Management
GI	Gull Island
HADD	Harmful Alteration Disruption or Destruction
HVdc	High Voltage direct current
IMS	Integrated Management System
km	kilometre
kV	kilovolt

MW	Megawatt
PEG NL	Professional Engineers and Geoscientists of Newfoundland and Labrador
PMF	Probable Maximum Flood
PO	Purchase Order
TLH	Trans Labrador Highway
WS&T	Works, Services and Transportation

## 2.0 Component A – Gull Island Hydroelectric Development

### 2.1 Description of Component A

Gull Island is one of two hydroelectric developments being planned for the lower Churchill River. The remotely controlled 2,250 MW Gull Island Hydroelectric Plant will be comprised of the following sub-components and associated ac connector lines to an ac switchyard:

- a) 35 km of access roads, including upgrading and new construction, and temporary bridge spanning the Churchill River.
- b) A 2,000 person Accommodations Complex (for construction period)
- c) Permanent accommodations – 40 person capacity
- d) Reservoir clearing.
- e) Replacement fish habitat.
- f) Erosion control facilities for construction period.
- g) A 100 m high x 1400 m long concrete faced rockfill dam (CFRD), with upstream and downstream cofferdams, including:
  - 1,440,000 m<sup>3</sup> of foundation overburden excavation, and 11,200,000 m<sup>3</sup> of earth/rockfill,
  - 31,000 m<sup>3</sup> of concrete in a slurry diaphragm wall (maximum depth to bedrock +/- 50 m),
  - 44,000 m<sup>3</sup> of concrete in upstream face, and
  - 240,000 m<sup>3</sup> of roller compacted concrete (RCC) in two interface dams.
- h) River diversion designed for 4,800 m<sup>3</sup>/s flow, including:
  - 2,350,000 m<sup>3</sup> of overburden and 1,040,000 m<sup>3</sup> of open cut rock excavation,
  - 26,000 m<sup>3</sup> concrete and 4 vertical lift gates at inlet portal,
  - 2 tunnels, 14 m wide x 20.5 m high inverted “U” with 528,000 m<sup>3</sup> of tunnel rock excavation, and
    - A fish compensation flow facility in one tunnel.
- i) Spillway – capacity of 20,800 m<sup>3</sup>/s, including:
  - Approach and discharge channels, a flip bucket and plunge pool,
  - 8 vertical lift gates,
  - 2,260,000 m<sup>3</sup> of overburden and 5,430,000 m<sup>3</sup> of open cut rock excavation, and
  - 93,000 m<sup>3</sup> of concrete.
- j) Intake and penstocks, including:
  - 5 intakes with gates and trash racks,
  - 67,000 m<sup>3</sup> of open cut rock excavation,
  - 81,000 m<sup>3</sup> of concrete,
  - 5 tunnel penstocks,
  - 74,000 m<sup>3</sup> of tunnel rock excavation, and
  - 30,000 m<sup>3</sup> of concrete lining and partial steel lining.
- k) Powerhouse and tailrace, including:
  - 5 turbine generator units at 450 MW with associated ancillary electrical/mechanical and protection/control equipment,
  - 5 power transformers, located on a rock bench above the powerhouse,
  - 2 overhead cranes,
  - 880,000 m<sup>3</sup> of overburden and 560,000 m<sup>3</sup> of open cut rock excavation,
  - 120,000 m<sup>3</sup> of concrete, and
  - 2,600 tonnes of structural/miscellaneous steel and metal cladding.
- l) Split ac Switchyard, including:
  - 5-230 kV connector lines from powerhouse,
  - 2 outgoing 230 kV lines, and
  - 2 outgoing 735 kV lines.
- m) Churchill Falls Switchyard extension.

- n) The Port facilities at Happy Valley Goose Bay need to be investigated and some upgrades may be necessary as a result of those investigations. The extent of those upgrades will be determined in the future.

Further information related to Component A is contained in "Lower Churchill Project – Basis of Design", document number MSD-PM-006 located in, Attachment B, Company Provided Documents herein.

## 2.2 Scope of Work A

### 2.2.1 General

Scope of Work A under the Engineering Design and Project Support Agreement includes for the provision of complete engineering services including engineering management and supervision of engineering-specific personnel for scope under the Engineering Design and Project Support Agreement, for Component A – Gull Island Hydroelectric Development. With reference to Figure 2 - Lower Churchill Project Gateway Process, services will span from start of Phase 3 through Phase 4 and extending to start of operations.

Scope will include all levels of engineering necessary to meet the requirements dictated by the Project's contracts plan, and includes preparation of design briefs, design reports, engineering drawings, documents, technical specifications and other technical content for inclusion in contract and procurement packages (both pre and post contract award), system engineering, as well as the provision of analytical and technical support through to project completion. Scope will also include preparation of commissioning procedures, in conjunction with Company.

All engineering work shall be performed by experienced personnel, and Consultant shall use the necessary tools, either Company provided or agreed to be supplied by Consultant and endorsed by Company e.g. recognized and verified computer programs, to perform the engineering work in a professional manner and in accordance with accepted engineering practices.

A complete listing of the contract packages associated with Component A – Gull Island Hydroelectric Development is included in Attachment A. Contracting and procurement activities will be undertaken by the project management team on Company paper. It is expected that Consultant engineering personnel will, as part of their engineering-specific duties, perform the role of package engineer in support of contracting activities.

As detailed in Section 5.0 of this Scope of Work and Technical Attachments, in addition to engineering-specific services the scope of the Engineering Design and Project Support Agreement includes for the provision of other personnel (Scope of Work D) who may be incorporated into the Company led project management team as required by Company to bolster the project management team. It is expected that selected engineering personnel, upon completion of engineering-specific scopes associated with Component A, may be reassigned to other roles within the project management team. Such roles may not necessarily be limited to execution of physical Component A. In particular, it is expected that selected personnel will participate in site activities, including commissioning.

### 2.2.2 Earlier Work

Significant engineering work was carried out by Company in 2007 and 2008. A complete listing of the relevant documentation (as well as a selected listing of earlier study reports from 1997-2000 timeframe), is contained Section 6 – "Existing Technical Information" herein, this documentation will be made available in any subsequent Request for Proposal. It is noted that a broader base of study reports dating back to the 1960's is available in-house. As a result of the earlier work, the overarching project definition is now in place as described in the "Lower Churchill Project – Basis



of Design". Work under the Engineering Design and Project Support Agreement will build on, and not duplicate, the earlier work.

### **2.2.3 Engineering Definition Required for Gate 3**

With reference to document MSD-PJ-006 "Cost Estimate Classification System" located in this Appendix 3, Attachment B, Company Provided Documents herein, it is a requirement that a Class 2 cost estimate be in place for the Lower Churchill Project at Gate 3 (refer to Figure 2 - Lower Churchill Project Gateway Process). In order to realize the required cost estimate accuracy, it is anticipated that the level of project engineering and associated documentation for inclusion in the Component A contract packages at the contract bid stage during Phase 3 will, of necessity, need to be some 70% complete. The remaining engineering and associated documentation to achieve full project definition would be prepared by Consultant during the bid evaluation phase for the various contracts (during the remainder of Phase 3) continuing through Phase 4, and would be scheduled to meet project execution requirements.

In summary, for Component A and with respect to the Lower Churchill Project Gateway Process (refer to Figure 2), much of the detailed engineering will be carried out in Phase 3.

### **2.2.4 Engineering Deliverables Summary**

It is estimated that some 1000 engineering deliverables will be required to be prepared by Consultant for Component A engineering. The deliverables are anticipated to be comprised of some 800 engineering drawings and some 200 other deliverables which include design briefs, study reports, technical specification packages, functional specification packages, commissioning manuals, operation and maintenance manuals, environmental mitigation document packages, operability review reports and other technical documents. This number does not include detailed concrete reinforcing drawings and associated bar-bending schedules, concrete lift drawings, or isometric drawings of concrete lifts as it is assumed that these may be produced by construction contractors.

The Contracts Package Listing in Attachment A hereto, includes a compilation of the types of engineering deliverables associated with each Contract Package.

## **2.3 Capability**

Consultant must demonstrate previous engineering on at least two (2) mega hydroelectric projects and have the experienced personnel to provide the services required for the Engineering Design and Project Support Agreement. If Consultant intends to supplement its capability with outside expertise, details are to be provided in its proposal for the Engineering Design and Project Support Agreement.

## **2.4 Design Liability / Responsibility**

Design liability / responsibility for Component A detailed engineering performed by Consultant shall reside with Consultant.

Design liability / responsibility for the functional specifications produced by Consultant required for inclusion in selected Engineering, Procurement and Construction (EPC) type contracts wherein the successful EPC contractor(s) will perform detailed design as well as procurement and construction activities (e.g. Turbine and Generator supply), shall reside with Consultant.

Design liability / responsibility for detailed engineering performed by others as part of their contractual obligations under (EPC) type contracts will reside with the successful EPC contractor(s) and not with Consultant.

All engineering designs produced by Consultant shall be subject to review and comment by Company in accordance with Company's requirements. Such review and comment shall in no way result in design liability / responsibility by Company.

## **2.5 Best Practices**

Consultant shall perform the Work to ensure that best overall value is achieved for Company. Consultant shall be proactive in identifying and implementing best practices with regard to the Work. Alternatively, Company reserves the right to introduce best practices to improve business practices specific to the Work. Where process or technology changes impact Consultant, Consultant shall be required to adopt the process changes or technology into its work practices as directed by Company.

Life Cycle Cost Analysis shall be employed where warranted. Document "Lower Churchill Project – Life Cycle Cost Design Philosophy for Equipment, Assets and Structures" Document Number MSD-PM-010 located in Attachment B, Company Provided Documents herein provides guidelines.

### 3.0 Component B – High Voltage Direct Current Transmission System Specialties

#### 3.1 Description of Component B

Component B consists of the Submarine Cable and HVdc Converter Station systems associated with the high voltage direct current (HVdc) transmission system for the Lower Churchill Project. The Component B HVdc projects will be comprised of the following:

##### a) HVdc Converter Stations:

- i.) Gull Island HVdc Converter Station
  - 230 kV ac to  $\pm 450$  kV dc Converter Station
  - Operational as a rectifier
  - 1600 MW continuous rating (800 MW per pole)
  - Higher rating required for overload conditions
  - Sea Electrode located in Lake Melville connected to the Converter Station
- ii.) Soldiers Pond Converter Station
  - $\pm 450$  kV dc to / from 230 kV ac Converter Station
  - Operational as a rectifier and an inverter for bi-directional power flow
  - 800 MW continuous rating (400 MW per pole)
  - Higher rating required for overload conditions
  - Sea Electrode located in Conception Bay connected to the Converter Station

##### b) HVdc Switchyards:

- i.) Strait of Belle Isle Submarine Cable Terminations Switchyards
  - One switchyard 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.

##### c) HVdc Submarine Cables:

- i.) Strait of Belle Isle
  - Submarine Cables capable of carrying 1600 MW continuous rating
  - Higher rating required for overload conditions
  - Corridors ranging from 28 km to 35 km in length
  - Physical protection scheme required

Further information related to Component B is contained in "Lower Churchill Project – Basis of Design", document number MSD-PM-006 located in Attachment B, Company Provided Documents herein.

##### d) Island Upgrades (potential scope)

- i.) Some additions and modifications to Hydro's existing Island transmission system may be required to successfully integrate the HVdc system, and to accept the power it transmits into the Island grid. Potential additions and modifications to existing infrastructure that may be required include the installation of transmission line compensation equipment, synchronous condensers, static var compensators, circuit breakers, disconnect switches and instrumentation. New transmission line and conductor replacement and mid-span structure installations on some existing transmission lines may also be required in order to increase the transmission capacity. (the technical aspects of these requirements will be included in

Component C) Potentially, a new terminal station may also be required in the Come by Chance area.

## 3.2 Scope of Work B

### 3.2.1 General

Scope of Work B under the Engineering Design and Project Support Agreement includes for the provision of engineering services, including engineering management and supervision of engineering-specific personnel for scope under the Engineering Design and Project Support Agreement, for Component B – High Voltage Direct Current Transmission System Specialties. With reference to Figure 2 - Lower Churchill Project Gateway Process, services will span from start of Phase 3 through Phase 4 and extending to start of operations.

Scope will include all levels of engineering necessary to meet the requirements dictated by the Project's contracts plan. In accordance with the contracts plan, it is anticipated that the contracts that will be put in place for provision of Component B facilities will be Engineering, Procurement and Construction (EPC) type contracts wherein the successful EPC contractor(s) will perform detailed design as well as procurement and construction activities. The scope of work under the Engineering Design and Project Support Agreement is to provide design briefs, functional specifications / technical documentation for inclusion in the discrete contract packages, for tendering by Company, to perform system engineering, as well as to provide analytical and technical support through to project completion. It is expected that significant engineering study work and associated analyses related to the Strait of Belle Isle marine crossing will be required to be performed by Consultant in order to provide the required information for tendering the EPC contracts. Scope will also include preparation of commissioning procedures, in conjunction with Company.

All engineering work shall be performed by experienced personnel, and Consultant shall use the necessary tools, either Company provided or agreed to be supplied by Consultant and endorsed by Company e.g. recognized and verified computer programs, to perform the engineering work in a professional manner and in accordance with accepted engineering practices.

A complete listing of the contract packages associated with Component B – High Voltage Direct Current Transmission System Specialties is included in Attachment A attached hereto. Contracting and Procurement activities will be undertaken by the project management team on Company paper. It is expected that Consultant engineering personnel will, as part of their engineering-specific duties, perform the role of package engineer in support of contracting activities.

As detailed in Section 5.0 of this Scope of Work and Technical Attachments, in addition to engineering-specific services the scope of the Engineering Design and Project Support Agreement includes for the provision of other personnel (Scope of Work D) who may be incorporated into Company's project management team as required by Company to bolster the project management team. It is expected that selected engineering personnel, upon completion of engineering-specific scopes associated with Component B, may be reassigned to other roles within the project management team. Such roles may not necessarily be limited to execution of physical Component B. In particular, it is expected that selected personnel will participate in site activities, including commissioning.

### 3.2.2 Earlier Work

Significant engineering work was carried out by Company in 2007 and 2008. A complete listing of the relevant documentation (as well as a selected listing of earlier study reports from 1997-2000 timeframe), is contained Section 6 – "Existing Technical Information" herein. It is noted that a

broader base of study reports dating back to the 1960's is available in-house. As a result of the earlier work, the overarching project definition is now in place as described in the "Lower Churchill Project – Basis of Design". Work under the Engineering Design and Project Support Agreement will build on, and not duplicate, the earlier work.

### 3.2.3 Engineering Definition Required for Gate 3

With reference to document MSD-PJ-006 "Cost Estimate Classification System" located in Attachment B, Company Provided Documents herein, it is a requirement that a Class 2 cost estimate be in place for the Lower Churchill Project during Phase 3. (Refer to Figure 2 - Lower Churchill Project Gateway Process). With respect to Component B EPC type contract packages, the scope definition for inclusion in the EPC bid packages will need to be to such a level as to provide assurance and certainty that the outturn costs for the contracts will meet the estimate expectations. To achieve the required level of scope definition, all necessary study work and associated analyses, particularly definition of physical data, marine installation requirements, and other technical information associated with the Strait of Belle Isle marine crossing will need to be comprehensive. Accordingly, further study work over and above that performed by Company to date may be required to be performed during Phase 3.

### 3.2.4 Engineering Deliverables Summary

It is estimated that some 200 engineering deliverables will be required to be prepared by Consultant for Component B engineering. While the main engineering deliverables will be the functional specifications for the contract packages, other deliverables include system study reports, design briefs, site selection studies, commissioning manuals, operation and maintenance manuals, environmental mitigation document packages, operability review reports, other technical documents as well as some 100 drawings (site mapping and other engineering drawings).

The Contracts Package Listing in Attachment A hereto, includes a compilation of the types of engineering deliverables associated with each Contract Package.

**Note:** The potential scope related to the Island Upgrades is not included in the above.

## 3.3 Capability

Consultant must demonstrate previous engineering on at least two (2) major High Voltage Direct Current (HVdc) bi-polar, bi-directional projects and have the experienced personnel to provide the services required for the Engineering Design and Project Support Agreement. In particular Consultant must demonstrate previous experience with submarine cable installations. If Consultant intends to supplement its capability with outside expertise, details are to be provided in its proposal for the Engineering Design and Project Support Agreement.

As noted in Section 1.1 of the Instructions to Proponents, there is a potential for the transmission facilities to connect the island of Newfoundland to Nova Scotia or New Brunswick via additional transmission lines, a sub-sea cable and associated converter station. Accordingly, the Consultant should also demonstrate experience in the design of multi-terminal HVdc schemes.

## 3.4 Design Liability / Responsibility

The design liability / responsibility for the functional specifications produced by Consultant which are required for inclusion in Component B EPC contracts, as well as design liability / responsibility for any Component B detailed engineering performed by Consultant shall reside with Consultant.

Design liability / responsibility for detailed engineering performed by others as part of their contractual obligations under EPC contracts will reside with the successful EPC contractor(s) and not with Consultant.

All engineering designs produced by Consultant shall be subject to review and comment by Company in accordance with Company's requirements. Such review and comment shall in no way result in design liability / responsibility by Company.

### **3.5 Best Practices**

Consultant shall perform the Work to ensure that best overall value is achieved for Company. Consultant shall be proactive in identifying and implementing best practices with regard to the Work. Alternatively, Company reserves the right to introduce best practices to improve business practices specific to the Work. Where process or technology changes impact Consultant, Consultant shall be required to adopt the process changes or technology into its work practices as directed by Company.

Life Cycle Cost Analysis shall be employed where warranted. Document "Lower Churchill Project – Life Cycle Cost Design Philosophy for Equipment, Assets and Structures" Document Number MSD-PM-010 located in Attachment B, Company Provided Documents herein provides guidelines.

## 4.0 Component C – High Voltage Overhead Transmission Lines

### 4.1 Description of Component C

The High Voltage Overhead Transmission Lines projects required for the Lower Churchill Project comprise the following:

#### a) High Voltage Alternating Current (HVac) Overhead Transmission Lines:

- i.) 735 kV ac Transmission Line from Gull Island to Churchill Falls
  - Three phase, quad bundle conductor
  - galvanized lattice steel V-guyed suspension and rigid angle towers
  - 200 km long
- ii.) 735 kV ac Transmission Line from Gull Island to the Quebec Border
  - Three phase, quad bundle conductor
  - galvanized lattice steel V-guyed suspension and rigid angle towers
  - 170 km long

#### b) High Voltage Direct Current (HVdc) Overhead Transmission Lines:

- i.)  $\pm 450$  kV dc Transmission Line from Gull Island Converter Station to Soldiers Pond Converter Station (near St. John's, NL)
  - bipole line, single conductor
  - galvanized lattice steel guyed suspension and rigid angle towers
  - 1100 km long
- ii.) Export Transmission Line (To Be Advised)

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

Further information related to Component C is contained in "Lower Churchill Project – Basis of Design", document number MSD-PM-006 located in Attachment B, Company Provided Documents herein.

### 4.2 Scope of Work C

#### 4.2.1 General

Scope of Work C under the Engineering Design and Project Support Agreement includes for the provision of complete engineering services, including engineering management and supervision of engineering-specific personnel for scope under the Engineering Design and Project Support Agreement, for Component C – High Voltage Overhead Transmission Lines. With reference to Figure 2 - Lower Churchill Project Gateway Process, services will span from start of Phase 3 through Phase 4 and extending to start of operations.

Scope will include all levels of engineering necessary to meet the requirements dictated by the Project's contracts plan, and includes preparation of design briefs, design reports, engineering drawings, documents, technical specifications and other technical content for inclusion in contract and procurement packages (both pre and post contract award), system engineering, as well as the provision of analytical and technical support through to project completion. Scope will also include preparation of commissioning procedures, in conjunction with Company.

All engineering work shall be performed by experienced personnel, and Consultant shall use the necessary tools, either Company provided or agreed to be supplied by Consultant and endorsed by Company e.g. recognized and verified computer programs, to perform the engineering work in a professional manner and in accordance with accepted engineering practices.

A complete listing of the contract packages associated with Component C – High Voltage Overhead Transmission Lines is included in Attachment A to this Scope of Work and Technical Attachments. Contracting and Procurement activities will be undertaken by the project management team on Company paper. It is expected that Consultant engineering personnel will, as part of their engineering-specific duties, perform the role of package engineer in support of contracting activities.

As detailed in Section 5.0 of this Scope of Work and Technical Attachments, in addition to engineering-specific services the scope of the Engineering Design and Project Support Agreement includes for the provision of other personnel (Scope of Work D) who may be incorporated into the Company led project management team as required by Company to bolster the project management team. It is expected that selected engineering personnel, upon completion of engineering-specific scopes associated with Component C, may be reassigned to other roles within the project management team. Such roles may not necessarily be limited to execution of physical Component C. In particular, it is expected that selected personnel will participate in site activities, including commissioning.

#### **4.2.2 Earlier Work**

Significant engineering work was carried out by Company in 2007 and 2008. A complete listing of the relevant documentation (as well as a selected listing of earlier study reports from 1997-2000 timeframe), is contained Section 6 – “Existing Technical Information” herein. It is noted that a broader base of study reports dating back to the 1960’s is available in-house. As a result of the earlier work, the overarching project definition is now in place as described in the “Lower Churchill Project – Basis of Design”. Work under the Engineering Design and Project Support Agreement will build on, and not duplicate, the earlier work.

#### **4.2.3 Engineering Definition Required for Gate 3**

With reference to document MSD-PJ-006 “Cost Estimate Classification System” located in located in this Appendix 3, Attachment B, Company Provided Documents herein, it is a requirement that a Class 2 cost estimate be in place for the Lower Churchill Project at Gate 3 (refer to Figure 2 - Lower Churchill Project Gateway Process). In order to realize the required cost estimate accuracy, it is anticipated that the level of project engineering and associated documentation for inclusion in the Component C contract packages at the contract bid stage during Phase 3 will, of necessity, need to be some 70% complete. The remaining engineering and associated documentation to achieve full project definition would be prepared by Consultant during the bid evaluation phase for the various contracts (during the remainder of Phase 3) continuing through Phase 4, and would be scheduled to meet project execution requirements.

In summary, for Component C and with respect to the Lower Churchill Project Gateway Process (refer to Figure 2), much of the detailed engineering will be carried out in Phase 3.

#### **4.2.4 Engineering Deliverables Summary**

It is estimated that some 2600 drawings will be required to be prepared by Consultant for Component C engineering. In addition to drawings, some 100 other deliverables consisting of design briefs, study reports, technical specification packages, commissioning manuals, operation and maintenance manuals, environmental mitigation document packages, operability review reports and other technical documents will be required.



The Contracts Package Listing in Attachment A hereto, includes a compilation of the types of engineering deliverables associated with each Contract Package.

#### **4.3 Capability**

Consultant must demonstrate previous engineering on at least two (2) major overhead transmission line projects and have the experienced personnel to provide the services required for the Engineering Design and Project Support Agreement. If Consultant intends to supplement its capability with outside expertise, details are to be provided in its proposal for the Engineering Design and Project Support Agreement.

#### **4.4 Design Liability / Responsibility**

Design responsibility / liability for Component C detailed engineering shall reside with Consultant.

All engineering designs produced by Consultant shall be subject to review and comment by Company in accordance with Company's requirements. Such review and comment shall in no way result in design liability / responsibility by Company.

#### **4.5 Best Practices**

Consultant shall perform the Work to ensure that best overall value is achieved for Company. Consultant shall be proactive in identifying and implementing best practices with regard to the Work. Alternatively, Company reserves the right to introduce best practices to improve business practices specific to the Work. Where process or technology changes impact Consultant, Consultant shall be required to adopt the process changes or technology into its work practices as directed by Company.

Life Cycle Cost Analysis shall be employed where warranted. Document "Lower Churchill Project – Life Cycle Cost Design Philosophy for Equipment, Assets and Structures" Document Number MSD-PM-010 located in Attachment B, Company Provided Documents herein provides guidelines.

## 5.0 Scope of Work D – Provision of Support Personnel

### 5.1 Description of Scope of Work D

Other personnel, to bolster the project management team both in the home office as well as at the various site offices, may be provided under the Engineering Design and Project Support Agreement. Support personnel may be required within the following functional areas:

- Construction Management (including but not limited to, Construction Managers, Construction Engineers, Constructability Engineers, Area Engineers, Mechanical and Electrical Installation Engineers, Concrete specialists, Construction Inspectors, Commissioning Engineers).
- Project Controls (consisting of estimating, cost control, planning and scheduling).
- Contracts and Procurement
- Benefits Monitoring
- Information Management
- Office Management
- Quality Management
- Safety Management
- Environmental Management
- Risk Management
- Labour Relations
- Human Resources
- Accounting

## 6.0 Existing Technical Information

Significant engineering work was carried out by Company in 2007 and 2008. The reports associated with this work are listed below. In addition to the 2007 / 2008 reports other technical documents, which provide background information to the Lower Churchill Project, are also listed below. The "Lower Churchill Project – Basis of Design", document number MSD-PM-006, which provides the overarching project definition that will be used as the primary reference to prepare engineering design criteria, design briefs, detailed design specifications and other technical documentation, has been developed by Company based on the results of the engineering work described in the noted reports.

**NOTE: These documents are shown for reference purposes only to indicate the amount of information available however they are not provided at this time and will form a part of any subsequent Request for Proposal.**

### Engineering Studies comprising the 2007 / 2008 Engineering Program

#### Gull Island Hydroelectric Development

GI1010	Gull Island Site 2007 Investigation
GI1013	Gull Island Site 2008 Investigation
GI1015	Inspection and Structural Analysis Goose Bay Dock
GI1020	Study of Concrete Face Rockfill Dam (CFRD) Alternative
GI1030	Powerhouse Configuration
GI1050	Tailrace Channel Improvements Phase 1 – Preliminary Assessment
GI1060	Review of Structure Layouts and Interfaces
GI1061	Review of Structure Layouts and Interfaces – 5 x 450 MW
GI1070	2008 Ice Observation Program
GI1071	Ice Studies
GI1090	Review of Construction Camp and Other Infrastructure
GI1100	Review of Access Roads and Bridges
GI1110	Hydraulic Modeling of River
GI1130	River Operation during Construction & Impounding
GI1140	PMF and Construction Design Flood Study
GI1170	Seismicity Analysis
GI1180	Review of Site Access, Goose Bay and Off-Site Infrastructure
GI1190	Dam Break Study
GI1200	Gull Island Constructability Review
GI1230	Gull Island Site Information for Tenderers
GI1280	Gull Island – Diversion Facilities Numerical Modeling
GI1281	Gull Island – Power Intake and Spillway Facilities – Numerical Modeling
GI1282	Gull Island – Diversion Facilities Physical Modeling Technical Specifications
GI1290	Hydraulic Production Model
GI1300	Gull Island 2008 Report Plates (drawings)
GI1310	Workshop Report on Design and Operational Problems Resulting from Reservoir Preparation

#### Muskrat Falls Hydroelectric Development

MF1010	Review of Variants
MF1020	Muskrat Falls Site Investigations
MF1050	Spillway Design Review
MF1080	Review of Construction Camp and Other Infrastructure
MF1090	Review of Access Roads and T&W Bridge
MF1120	Potential Impact of Reservoir Flooding on TLH
MF1130	River Operation During Construction and Impounding

MF1250 Numerical Modeling of Muskrat Falls Structures  
 MF1260 Assessment of Existing Pumpwell System

#### HVAc Transmission Lines

AC1020 Tower Type Selection, 735 kV  
 AC1030 Field Investigations and Construction Requirements - 735 kV Transmission Line Gull Island to Churchill Falls  
 AC1050 Tower Type Selection, 230 kV  
 AC1060 Field Investigations and Construction Requirements - 230 kV Transmission Line Muskrat Falls to Gull Island  
 AC1080 Load Control and Failure Containment  
 AC1090 Assess Cable De-icing  
 AC1100 Conductor Selection  
 AC1130 Corridor Selection & Construction Infrastructure - 735 kV Transmission Line - Gull Island to Quebec Border

#### HVdc Transmission Systems

DC1010 Voltage and Conductor Optimization  
 DC1020 HVdc System Integration Study  
 DC1050 Corridor Selection & Construction Infrastructure-Gull Island to Soldiers Pond  
 DC1051 Field Investigations - HVdc TL - Gull Island to Soldiers Pond  
 DC1060 Corridor Selection & Construction Infrastructure-Taylor's Brook to Cape Ray  
 DC1070 Preliminary Meteorological Load Review  
 DC1080 Tower Type Selection and Preliminary Optimization  
 DC1090 Site Investigation - Converter Stations Gull Island and Soldiers Pond  
 DC1110 Electrode Review - Gull Island and Soldiers Pond  
 DC1130 Submarine Cable - Strait of Belle Isle  
 DC1131 Submarine Cable Corridor Survey - Strait of Belle Isle  
 DC1132 Strait of Belle Isle - Existing Data Compilation  
 DC1133 Regional Multi-Beam Survey  
 DC1140 Submarine Cable - Cabot Strait  
 DC1141 Submarine Cable Corridor Survey - Cabot Strait  
 DC1142 Cabot Strait - Existing Data Compilation  
 DC1180 Fixed Link Tunnel Cost, Strait of Belle Isle  
 DC1200 HVdc Overland Transmission Re-estimate  
 DC1210 VSC Risk Assessment

#### Other Documents

- MSD-PJ-007 Project Change Management Procedure
- Development of EHV Transmission Lines in Labrador – EDM/RSW - 1999
- Gull Island Power Development SNC-Lavalin Power Division - October 1997
- Gull Island Hydro Electric Development – SNC-AGRA Joint Venture - December 2000
- Gull Island to Soldiers Pond Interconnection – Teshmont Consultant Inc. - June 1998
- Muskrat Falls Hydroelectric Development – SNC-AGRA - January 1999
- Reservoir Preparation Plan – Sikumiut Environmental Management Ltd. – February 2008
- Lower Churchill Hydroelectric Generation Project Baseline Report, Application of HADD Determination Methodology – AMEC – December 2007
- Newfoundland and Labrador Hydro Environmental and Guiding Principles

A selection of the listed documents is located in this Scope of Work and Technical Attachments, Attachment B, Company Provided Documents herein.

**Note: Sections 7.0 through 14.0 inclusive:**

The following sections 7.0 through to 14.0 inclusive of the Scope of Work are based on the Project Delivery Model of a Company led integrated project management team which forms a base option for Company. Company encourages Proponents, as a part of any alternative proposal, to challenge and improve upon each section individually or as a whole as part of an alternative Project Delivery Model, taking care in both cases to outline the changes relative to the base, including associated benefits and drawbacks.

**7.0 Staffing Requirements for Project Management Team**

**7.1 Phase 3**

For Phase 3 (refer to Figure 2 - Lower Churchill Project Gateway Process), it is anticipated that the project management team will consist of the following approximate numbers of personnel:

Total Project Management Team                                      275 personnel (peak)

The anticipated composition of the project management team is described as follows:

- a) Owner's personnel and other personnel / consultants employed by Company: ~ 100-125 personnel
- b) Personnel which may be provided under the Engineering Design and Project Support Agreement: ~ 150 – 175 personnel inclusive. Includes personnel required for engineering-specific services for all three (3) Scopes of Work A, B and C, as well as additional personnel who will be incorporated into the Company led project management team in other functional areas (Scope of Work D).

Engineering-specific personnel requirements (to be provided under the Engineering Design and Project Support Agreement), are estimated to be as follows:

- Engineering personnel for Scope of Work A                                      ~ 60 - 80 personnel
- Engineering personnel for Scope of Work B                                      ~ 20 - 30 personnel
- Engineering personnel for Scope of Work C                                      ~ 40 - 50 personnel

**7.2 Phase 4**

For Phase 4, it is anticipated that the project management team will consist of the following approximate numbers of personnel:

Total Project Management Team                                      ~ 300 - 350 personnel

The anticipated composition of the project management team is described as follows:

- c) Owner's personnel and other personnel / consultants employed by Company: ~ 100 – 125 personnel
- d) Personnel whom may be provided under the Engineering Design and Project Support Agreement: ~ 200 – 225 personnel inclusive.

It is recognized that through Phase 4, engineering-specific personnel requirements may reduce from that in place during Phase 3. As noted in Sections 2.0, 3.0 and 4.0 of this Scope of Work and Technical Attachments, it is expected that selected engineering personnel, upon completion of engineering-specific scopes, may be reassigned to other project execution support roles to bolster the Company led project management team both in the home office as well as at the various site offices.

## 8.0 Organization and Interfaces

### 8.1 General

Figure 3 provides a pictorial overview of the component streams for the Lower Churchill Project and depicts the Engineering Design and Project Support Agreement definition and interfaces within the project management team.

Figure 4 below provides an overview of the team model indicating the integration of the Consultant personnel within the project management team.

Figure 5 below provides the organization for the Leadership Team for the Lower Churchill Project and provides the reporting relationship for Components A, B and C engineering scope managers.

Note: Yellow colour denotes Consultant.

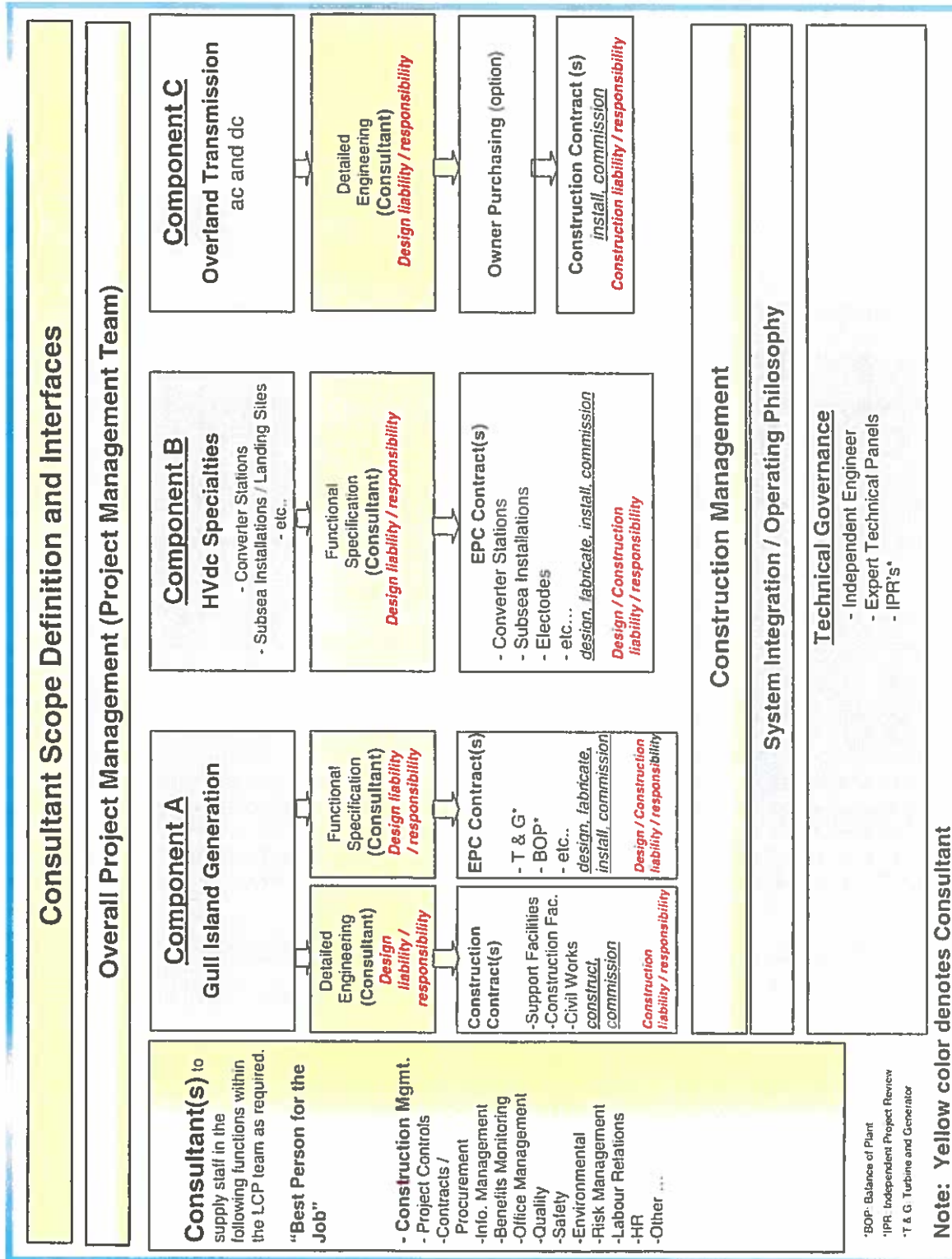


Figure 3 – Consultant Scope Definition and Interfaces

## Main Interactions and Interfaces to Produce & Manage PO's and Contracts

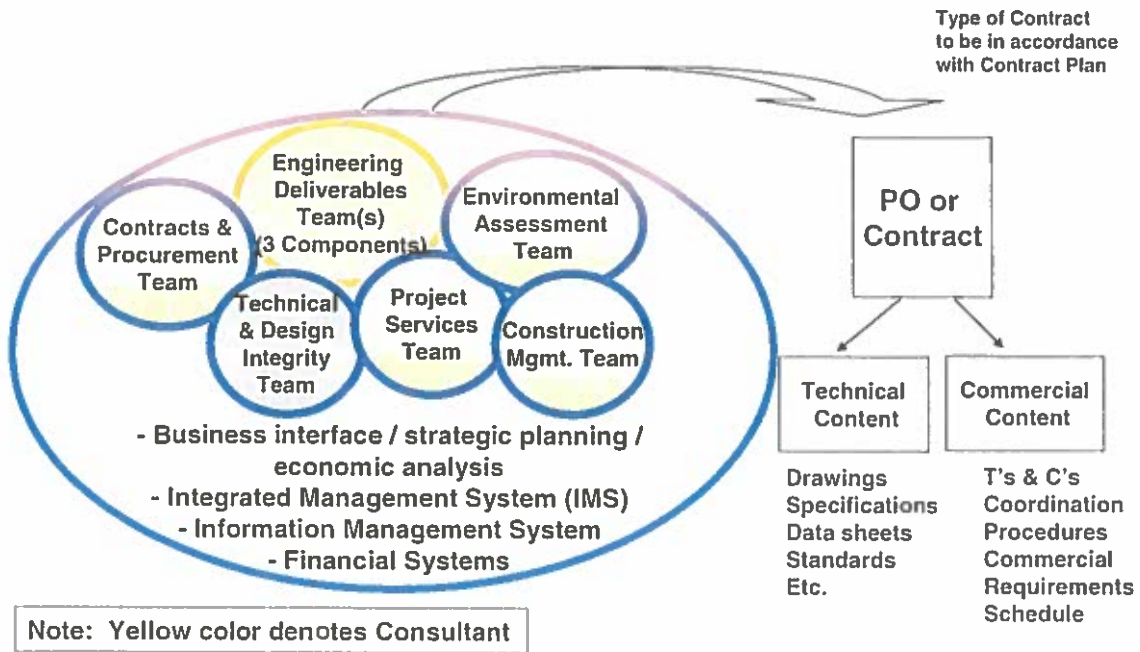


Figure 4 –Team Model with Consultant

## Leadership Organization

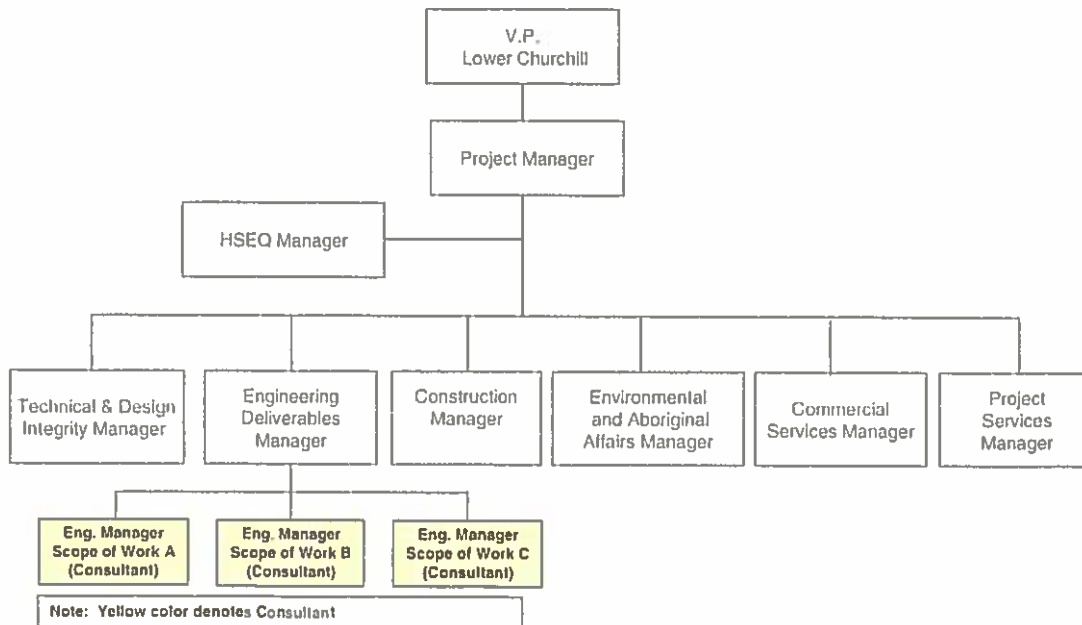


Figure 5 – Lower Churchill Project Leadership Organization with Consultant Reporting Relationship



## 8.2 Company's Technical and Design Integrity Oversight

### 8.2.1 General

Company will maintain oversight for technical and design integrity. As depicted in Figure 5, the project management team organization includes a dedicated Technical and Design Integrity group consisting of Company personnel assigned to perform the technical and design integrity role.

As part of its ongoing activities required to fulfill its responsibilities, this group will interface extensively with Consultant engineering team(s) for Components A, B and C to provide information and consultation support and to ensure Company's technical and design integrity requirements are being met. In addition, all design criteria, design briefs and other technical documentation produced by Consultant engineering team(s) for Components A, B and C will require review and comment in accordance with Company's requirements by Company's Technical and Design Integrity group. Such review and comment shall in no way result in design liability / responsibility by Company. All design codes and standards employed by Consultant engineering team(s) for Components A, B and C will require agreement of the Technical and Design Integrity group.

Consultant shall take all necessary measures to fully support Technical and Design Integrity group requirements and activities.

### 8.2.2 Design Basis Ownership

Among the main responsibilities of the Technical and Design Integrity group will be the ownership and maintenance of the "Lower Churchill Project - Basis of Design". Any required changes to the "Lower Churchill Project - Basis of Design" will be managed under the "Lower Churchill Project - Project Change Management Procedure" document number MSJ-PJ-007 located in Attachment B, Company Provided Documents herein.

### 8.2.3 Independent Engineers / Technical Panels / Lenders' Engineers

#### a) General

Company intends utilizing the services of Independent Engineers / Technical Panels to review the project elements, including engineering, throughout project execution. The Technical and Design Integrity group will organize and direct the activities of such groups.

There may also be a requirement for Company to accommodate a Lenders' Engineer, which may be employed throughout the execution of the Lower Churchill Project.

Consultant shall fully support these efforts.

#### b) Third Party Verification

From time to time Company may perform a design verification of certain elements of the design. This verification may be undertaken by Company and/or by a Third Party. The Technical and Design Integrity group will organize and direct the activities of such verification exercises.

Consultant engineering team(s) for Components A, B and C shall prepare design verification documentation as required by Company. The design verification documents may, as a minimum, include:

- requirements
- assumptions
- detailed calculations and analyses

- detailed drawings.

#### 8.2.4 Company Junior Engineers

Company expects to have some junior Company individuals available to the project team, and that these individuals will be embedded into the Consultant's Organization to gain project engineering experience. These individuals will be under the Company payroll however we anticipated that their day to day direction and all responsibility for their work will be the responsibility of the Consultant. It is anticipated that the valuable experience they will gain as a result of this will be a long term benefit to the Company over the life of their career. Consultant is to confirm their agreement to comply with Company's request. Planning and scheduling of engineering deliverables by Consultant shall not take into account Company's Junior Engineers contribution.

### 8.3 Construction Management Group

As depicted in Figure 5, the project management team organization includes a dedicated Construction Management group consisting of project management team personnel assigned to the construction management role.

As part of its ongoing activities required to fulfill its responsibilities, this group will perform, from time to time, constructability reviews on the project design. The constructability reviews will include reviews for the incorporation of safety elements, overall constructability and incorporation of best practices.

In addition to constructability reviews, all engineering drawings which will be utilized for construction will require review and comment by Company's Construction Management group. Such review and comment shall in no way result in design liability / responsibility by Company.

Consultant shall take all necessary measures to fully support the Construction Management group requirements and activities.

### 8.4 Project Interface System

#### 8.4.1 General

A dedicated Project Interface System will be established for the Project. The system will serve as a management tool to facilitate the management of interfaces throughout Project execution. The system will encompass all hard and soft interfaces identified throughout project development.

The interface system that will be utilized for the Lower Churchill Project is described in document "Lower Churchill Project – Interface Management System"; document number MSD-PM-013 located in Attachment B, Company Provided Documents herein.

Consultant will interface with Company and with third parties including, without limitation, Company's other contractors as required to perform the Work. All communications required among Company, Consultant, Company's other contractors, and other groups within the project management team with regard to interfaces shall be in accordance with Project interface system requirements. Consultant shall be responsible for preparation and management of all of its interface documentation, including, but not limited to interface registers, datasheets and drawings.

Consultant shall appoint an "Interface Co-ordinator" who shall be responsible for the overall co-ordination of Consultant's interfaces and who shall be the Consultant focal point for interface co-ordination between Consultant and all other parties.

Consultant shall take all necessary measures to fully support Project's interfacing requirements and activities.

#### 8.4.2 System Engineering

Consultant for Components A, B and C shall execute system engineering for the Work. This will include but not be limited to:

- Verification of interfaces between Consultant, its Sub-Contractors, Company and Company's other contractors.
- Verification of Consultant's designs to function with other designs to form a complete system, free from unacceptable weaknesses.

Consultant shall clearly identify all internal interdependencies and all interdependencies between Company and Company's other contractors for the various parts of the Work.

Consultant for Components A, B and C shall perform system engineering to verify system integrity when changes to the design occur.

The Project Interface System shall be used as a tool to help manage system engineering.

Consultant shall take all necessary measures to fully support Project's system engineering requirements and activities.

### 9.0 Consultant Management, Administration and Project Control

#### 9.1 General

Consultant shall provide all necessary personnel, services, facilities, systems, procedures and any other direct or indirect services, **if not provided by Company** and necessary for Consultant to manage, supervise, administer, execute and document the Work as required in support of the Work as defined in the Engineering Design and Project Support Agreement, including, but not limited to:

- Management and administration of the Work to ensure that the Work is performed in accordance with the contractual requirements for the Work, and to the satisfaction of Company and the appropriate regulatory, certification, and inspection authorities;
- Management and administration of the Work to ensure that the Work is performed in accordance with the Coordination Procedures under development and to be included in any subsequent Request for Proposal.
- Supervision, management and control of engineering for Consultant's scope;
- Participation in regular meetings with Company;
- Coordination of regular steering committee meetings with Company;
- Compliance with Company's administration and management procedures;
- Regular reporting of the status and progress of Work including the status and progress of subcontractors into Company system;
- Management of subcontractors as required to maintain the schedule and quality requirements of the Work.

#### 9.2 Engineering Deliverables

##### 9.2.1 Company's Engineering Deliverables Manager

As depicted in Figure 5, the project management team organization includes a dedicated Engineering Deliverables Manager.

As part of its ongoing activities required to fulfill its responsibilities, this Manager will have the following key accountabilities:

- Stewardship of overall Project engineering plan to meet project requirements;
- Approval of Consultant's deliverables listing;
- Approval of Consultant's engineering personnel;
- Approval of Consultant's mobilization and resourcing plan;
- Stewardship of the engineering deliverables production and schedule to meet contract package requirements;
- Management of the Project Interface System;
- Co-ordination of Company's Technical and Design Integrity group's and Construction Management group's interfacing with Consultant engineering team(s);
- Stewardship of engineering reporting;
- Stewardship of Management of Change for engineering scope and associated deliverables;
- Approval of engineering processes, procedures and tools;
- Coordination of engineering reviews;
- Stewardship of engineering quality.

Consultant for Components A, B and C will report to the Engineering Deliverables Manager with respect to the above accountabilities.

Further details of Engineering Deliverables Manager's accountabilities and associated Consultant's responsibilities are described in the following project procedures located in Attachment B, Company Provided Documents herein.

- "Lower Churchill Project - Engineering Resource Requirements and Approval Process", document number MSD-PM-011.
- "Lower Churchill Project – Progress and Performance Measurement Guidelines", document number MSD-PJ-005.
- "Lower Churchill Project – Quality Management Plan", document number MSD-QM-020.

Engineering Deliverables Manager activities shall in no way result in design liability / responsibility by Company.

Consultant shall take all necessary measures to fully support the Engineering Deliverables Manager's requirements and activities.

### 9.2.2 Consultant's Engineering Manager

As depicted in Figure 5, Consultant will provide a dedicated Engineering Manager for each of the Scopes of Work A, B and C as described in Sections 2.2, 3.2 and 4.2 herein respectively. The key activities, duties and responsibilities of Consultant's Engineering Manager for each of the Scopes of Work A, B and C are outlined as follows:

- Detailed definition of engineering scope to meet Company's Design Basis requirements and Contracts' plan;
- Management and control of execution of engineering and associated production of engineering deliverables for Scope of Work;
- Development of the engineering "Deliverables List" for Scope of Work;
- Production and maintenance of engineering schedules and budgets c/w resource requirements for Scope of Work for inclusion in overall engineering plan (in conjunction with LCP Project Services team );

- Staffing of engineering resources required to deliver Scope of Work;
- Assignment of Design responsibility within engineering team;
- Approval and implementation of engineering processes and procedures required for Scope of Work;
- Interfacing with Company's Technical and Design Integrity and Construction Management groups, and other consultants as required - implementation of inputs into engineering work per project procedures;
- Engineering reporting to meet project requirements;
- Utilization of and compliance with LCP Management of Change for Scope of Work;
- Coordination of internal engineering reviews – participation in Company led reviews;
- Execution of engineering quality for Scope of Work;
- Stewardship of PEG-NL requirements for Consultant's team.

### 9.3 Project Control Systems

The project management team will utilize a Project Control System which encompasses the following:

- Accounting
- Change Management
- Cost Estimating and Control
- Document Management
- Planning and Scheduling
- Progress Performance and Measurement
- Risk Management

Consultant shall, as part of operating within the project management team, provide data input into the Project Control System to meet Company's requirements. (e.g. timesheets information and document progress)

Consultant may be required to develop, in conjunction with Company, information formats and methods to meet project management team requirements.

Consultant shall comply with the needs and requirements of Company in this regard and as more particularly defined in the Coordination Procedures are not included as a part of the Expression of Interest and will form a part of any subsequent Request for Proposal.

## 10.0 Integrated Management System

To ensure that management responsibilities, processes and tools are documented, implemented, current and consistent across the Lower Churchill Project, the project management team, including Consultant, will operate within the Project's overarching Integrated Management System (IMS).

The IMS will consist of a framework of activities, resources, processes, procedures and tools to facilitate achievement of the accountabilities / responsibilities of the various functional groups comprising the project management team. The system will encompass all aspects of Project Management, Safety Management, Quality Management / Quality Control, and Environmental Management.

Tools/computer software to facilitate these services will be implemented.

Document MSD-PM-009, "LCP – Integrated Management System Strategy" located in Attachment B, Company Provided Documents herein provides further information related to the IMS.

With respect to engineering-specific scopes of work applicable to Components A, B and C, the IMS will include all engineering design and control procedures necessary to fulfill scope requirements.

Within the IMS, the Project may utilize systems, processes, procedures or tools identified by Consultant in its response to the Expression of Interest or any subsequent Request for Proposal.

## 11.0 Company Provided Resources

As outlined in Section 1.6 herein, Company's project office will initially house the entire project management team including personnel provided under the Engineering Design and Project Support Agreement. As the Project moves into the Execution Phase (Phase 4 - refer to Figure 2) Company will maintain the main project office and, in addition, Company will establish site offices which will house portions of the project management team as required to meet project requirements.

Company will provide all required furniture, equipment, telephone including local and long distance access, fax machines and computers, standard suite of office software, including access to email and including CADD software / system as required in its Company offices for all project management team personnel including Consultant.

## 12.0 Information Management

Information Management for the Lower Churchill Project includes all information created, generated or received as a result, or in support of, the activities required for planning, execution and project delivery. Included are the associated processes, resources and tools required to manage this information throughout its life cycle.

Project document "Lower Churchill Project - Information Management Strategy" document number MSD-IM-003 - located in Attachment B, Company Provided Documents herein provides the overall strategy and direction with respect to information management for the Lower Churchill Project.

## 13.0 Risk Management

The Lower Churchill Project has decided to implement a formal project risk management system to encourage the project team to look ahead, seek opportunities and avoid/mitigate problems before they arise. Successful project risk management promotes early awareness and risk monitoring that is vital to a project's success.

The Lower Churchill Project is dedicated to a proactive program of risk management to:

- Identify and analyze risks and opportunities which have potential safety, environmental, operational, cost, schedule or reputation implications on the Lower Churchill Project;
- Utilize knowledge of these risks and opportunities to facilitate more effective decision making by removing uncertainty and / or capitalizing on the opportunity;
- Timely and cost effectively respond to these risks and opportunities in order to control their potential adverse and / or beneficial impact on the Lower Churchill Project; and
- Allocate responsibility for the specific project risk to the party who can most efficiently and effectively manage the risk

Further details of Lower Churchill Project's Risk Management approach are described in the following project documents located in this Appendix 3, Attachment B, Company Provided Documents herein.

- "Lower Churchill Project – Project Risk Management Policy", document number MSD-RI-001.
  - "Lower Churchill Project – Project Execution Risk & Uncertainty Management Guidelines", document number MSD-RI-003.
- "Lower Churchill Project – Risk Management Philosophy", document number MSD-RI-004.

Consultant is responsible to ensure an understanding of the documentation requirements of Company, to participate in the Risk Management program and shall create and submit all required documentation as per Project requirements.

## 14.0 Document Management

Company's Information Management group within the project management team will provide overall document management services for the Lower Churchill Project.

Consultant shall meet requirements of Project document management processes including:

- "Lower Churchill Project – Management of Information Sets", document number MSD-IM-004.
- "Standard for the Production and Format of Engineering Drawings", document number MSD-IM-009.

These documents are located in Attachment B, Company Provided Documents herein.

Consultant is responsible to ensuring understanding of the documentation requirements of Company, and shall create and submit all required documentation as per Project requirements.

## 15.0 Project Coding

Coding of all information pertaining to the Lower Churchill Project shall be in accordance with document "Lower Churchill Project – Coding Standard", document number MSD-IM-008 located in Attachment B, Company Provided Documents herein.

## 16.0 Documentation for Operations

Consultant shall meet requirements of document "Documentation for Operations" document number MSD-IM-012 located in Attachment B, Company Provided Documents herein.

## 17.0 Canadian Regulations and Requirements

### 17.1 General

Consultant shall comply with all relevant statutory requirements and / or regulations of any governmental authorities having jurisdiction with respect to the Scope of Work.

Consultant shall prepare all documents, drawings, design briefs, analyses, manuals, etc. as required by any governmental authorities with respect to the Scope of Work.

Report "PM0010 Regulatory / Permitting List" located in Attachment B; Company Provided Documents herein highlights the consents, licenses, permits, notifications and approvals that may be required by the Lower Churchill Project, covering the project phases from pre-construction through to Operations.

### 17.2 Codes and Standards

Consultant shall execute engineering work in accordance with required design codes and standards, as agreed by Company's Technical and Design Integrity group.

## **18.0 Newfoundland and Labrador Requirements Related to the Practice of Engineering and Geoscience**

The Practice of Engineering and Geoscience in Newfoundland and Labrador is subject to the requirements of the Engineering and Geoscience Act RSNL1990 Chapter E-12 and Regulations, O.C. 96-941.

Professional Engineers and Geoscientists – Newfoundland and Labrador (PEG-NL), is responsible for regulating the practice of Engineering and Geoscience.

Consultant shall carry its work in compliance with the requirements of the Act and Regulations, and also with the requirements of PEG-NL.

### **ATTACHMENTS**

#### **Attachment A – Contracts Package Listing and Engineering Deliverable Types by Package**

**Note:** The Contract Packages listed herein are as a result of our preliminary analysis of the marketplace conditions. Company expects to modify and refine this Contract Package listing based upon further analysis of the contracting marketplace appetite and capabilities.

#### **Attachment B – Company Provided Documents**

**Note:** These documents are listed for reference purposes only and will be included in any subsequent Request for Proposal RFP.