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Appendix AA3-1: SSG Scope Overview Summary

PUC Distribution SSG Project Scope Summary
(selected header sections and subsections extracted for reference – Refer to EPC Contract Pricing and Responsibility Matrix for more detailed task breakout)

Project Overview

The Sault Smart Grid (SSG) Project for PUC Sault Ste. Marie (PUC) is a project to modernize its distribution energy infrastructure to enhance reliability, improve outage management, and reduce energy consumption through the design, procurement, installation, testing, commissioning, and training on the following set of technologies and applications:

- Advanced Distribution Management System (ADMS) software that includes integrated FDIR (for both distribution and sub-transmission) and VVO applications.
- Outage Management System (OMS) software that is tightly-integrated with the new ADMS to provide outage management functions.
- SCADA-enabled line distribution equipment such as reclosers, switches, and faulted circuit indicators (FCIs) to support FDIR.
- SCADA-enabled voltage regulators and capacitors to support VVO.
- FCIs that will support FDIR on the sub-transmission system where necessary.
- Cellular communications to collect the data and provide control in support of FDIR and VVO and will be integrated into existing PUC communication networks.
- Integration with the PUC's existing Customer Information System (CIS), Advanced Metering Infrastructure (AMI), and CYME distribution model.

Collectively these technologies and applications comprise the SSG that is standards-based and open, positioning the PUC to deploy and/or accommodate new distributed energy resources (DERs) such as photovoltaics, energy storage (batteries), cogeneration, and electric vehicles (EVs) and support smart city and other community growth initiatives.

This document provides a summary of the major EPC elements for the project including the Project Management portion of the project, the Step 2 Engineering, Step 2 Procurement, and Step 2 Construction/Implementation phases of the project across several Project Domains and includes the design basis for the SSG. Consistent Reviews of deliverables are included along with general and task-specific assumptions with each major task's description as needed. Equipment description (hardware and software) will be provided in a bill of material (BOM) with estimated quantities that will be finalized during the Step 1 Engineering. Major tasks are established for the required system integrations. Feeder selection for FDIR will be finalized during the Step 1 Engineering. A

proof-of-concept (PoC) for the VVO and FDIR applications will be performed, such that these tasks have their deliverables completed before the PoC can occur. (Refer to task CN1.3 Create Commissioning Plan.)

Additional references noted to help further define the project:

- Physical Scoping Diagram
- Logical Scoping Diagram
- Responsibilities Matrix

Step 1 Engineering

The Step 1 Engineering phase will perform enough design so that firm fixed pricing can be developed for Step 2 Engineering, Step 2 Procurement, Step 2 Construction/Implementation major tasks. All Step 1 Engineering major tasks start with the letter "V" for value-based. This includes engineering and procurement tasks across the PUC Operational Domain, PUC Field Domain, and PUC Organizational Domain. This will evaluate the performance of 48 distribution feeders, how they could be improved with FDIR, the expected improvements, and estimating the VVO savings for each distribution feeder (using a similar methodology as reported by Leidos). The goal is to determine the extent of FDIR equipment deployment across the distribution feeders in comparison to the estimated VVO energy savings.

PUC Operational Domain

The PUC operational domain includes CYME, ADMS, OMS, CIS, SCADA, and VIR. The ADMS applications VVO and FDIR will require field data supplied by the Survalent SCADA master from each of the intelligent electronic devices (IEDs) (such as FCI, regulator controller, and switch controller) supporting the field equipment and field devices to support the ADMS applications. DNP3 (IEEE 1815) will be used for communications to all field devices, using cellular communications. The VVO and FDIR applications require a feeder connectivity model that is maintained and up-to-date (refer to task refer to task VO1 Update CYME Model).

PUC Field Domain

The PUC Field Domain includes following major tasks:

- VF1 Calculate Feeder and 34.5kV Performance (CMI)
- V2 Field Engineering
- VF3 Future Reliability and Energy Savings Performance
- VF4 Select Feeders (12/24/36/48)

Step 2 Engineering

PUC Operational Domain

The engineering across the PUC operational domain will prioritize the completion of tasks related to a PoC for VVO and FDIR on a single substation (refer to task VF2.1 Establish Feeder Zones) and its associated feeders (refer to task VF4 Select Feeders (12/24/36/48)). Refer to CN1.3 Create Commissioning Plan.

The PUC operational domain has the following major tasks:

1. System integration in task EA1 System Integration.
2. The implementation of the Survalent OMS in task EA2 OMS.
3. The implementation of the Survalent ADMS in task EA3 ADMS.
4. The upgrade of the Survalent SCADA in task EA4 SCADA Master.
5. The implementation of the IVR solution in task EA5 IVR.
6. The development of the cut-over plan in task EA6 Develop Cut-Over Plan.
7. Implementation of a lab facility in task EA7 Lab Facility

PUC Substation Domain (Placeholder)

This is a placeholder for substation engineering work that may become required when substation transformers are replaced with LTC transformers. When these sites are identified in task VF2.5 Conduct Field Survey, those changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management and added here as required during Step 1.

PUC Field Domain

All of the PUC field domain tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan**Error! Reference source not found.**).

EF1 Detailed Design for Field Equipment

This task will perform the detailed design for the selected field locations for each feeder based upon the completed work in VF2.5 Conduct Field Survey. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

PUC Organizational Domain

EO1 Organizational Change Management

All of these change management tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan). The specific scope of this task will be determined through the completion of task VB1 Organizational Change. This task will implement the changes identified in the deliverable from task VB1 Organizational Change as approved by the PUC through task PM4 Change Management as in-scope processes.

Step 2 Procurement

Purchasing

All materials purchased for the project will meet the Ontario Regulation 22/04.

PR1 Major Materials and Equipment

This task will perform the procurement process following the project's procurement plan based upon the output of task VP2 Establish Material Management Requirements, an internal document as part of the PEP (refer to PM9 Project Execution Plan (PEP)) that defines all procurement activities:

- Purchasing and subcontracting
- Inspecting and testing
- Remittance

- Material management. Material management is comprised of all purchasing, expediting, supplier quality surveillance, traffic and logistics, and field purchasing and warehousing activities required for project execution.

Staging and Testing

All staging and testing tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

Step 2 Construction/Implementation

The construction domain includes the construction and implementation across operational, substation, and field domains, plus a commissioning phase that coordinates across all three domains. All construction will follow the Construction Execution Plan (CEP) and be performed to meet the Ontario Regulation 22/04.

Commissioning

The commissioning occurs during construction, spans all three domains, and relies on the SSG project being broken down into more "manageable pieces" for commissioning purposes. The definition of these "manageable pieces" will be a deliverable provided in task CN1.2 Create Turnover Packages. Once the "manageable pieces" are established, the Commissioning Plan (CP) is created by this task. The CP is used to document and manage the commissioning sequence for each defined "manageable piece".

The actual commissioning phase work starts when the construction team completes its work on items within a defined "manageable piece", provides the commissioning team with the turnover package, and the turnover package is accepted by the commissioning team. Each transfer is accomplished by using a turnover package, which will be a deliverable provided in task CN1.2 Create Turnover Packages.

Turnover is the transfer of the care, custody and control of the unit from construction personnel to commissioning personnel. Turnover may involve the transfer of substantial quantities of documentation and physical assets. All turnovers will be documented with detailed, itemized, signed manifests and receipts (refer to task CN1.2 Create Turnover Packages).

PUC Distribution SSG Project Scope Summary
(selected header sections and subsections extracted for reference – Refer to EPC Contract Pricing and Responsibility Matrix for more detailed task breakout)

PUC Operational Domain

CO1 Migrate SCADA to ADMS Server

This task will migrate the existing Survalent SCADA server from the existing, hardware platform to the new virtual environment (refer to task VO6 Identify the Virtual Server Requirements). The test plan developed from task EA4.4 Develop SCADA and ADMS Software Testing Plan will be followed to confirm correct operation of the new production environment.

PUC Substation Domain

Limited construction in the substation domain is planned for the SGG Project.

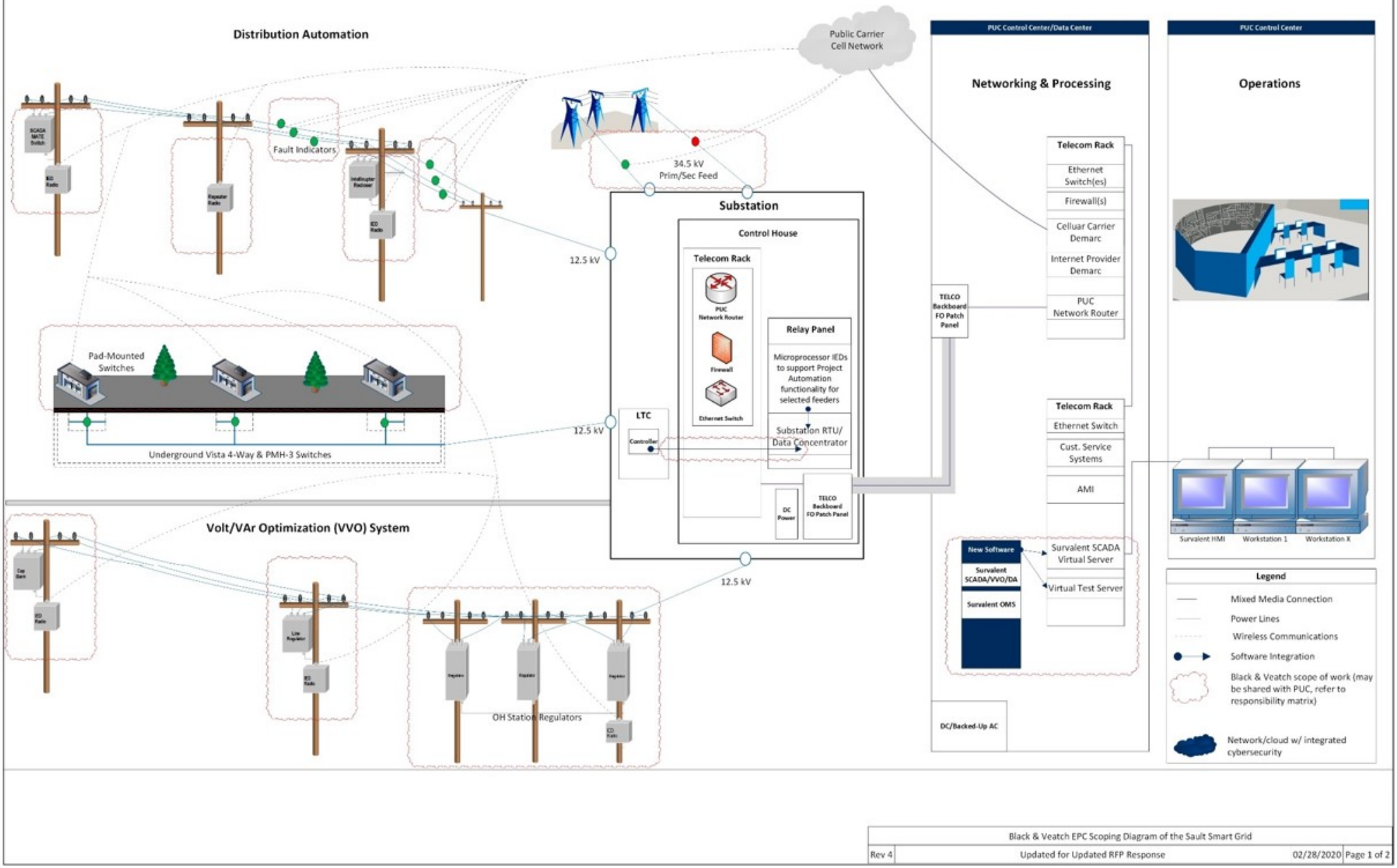
PUC Field Domain

CF1 Install Field Equipment

This task will install and test the field equipment (refer to Table 13) (outside the substations).

Appendix AA3-2: SSG Physical Scoping Diagram

PUC Sault Smart Grid – EPC Scoping Diagram



Black & Veatch EPC Scoping Diagram of the Sault Smart Grid			
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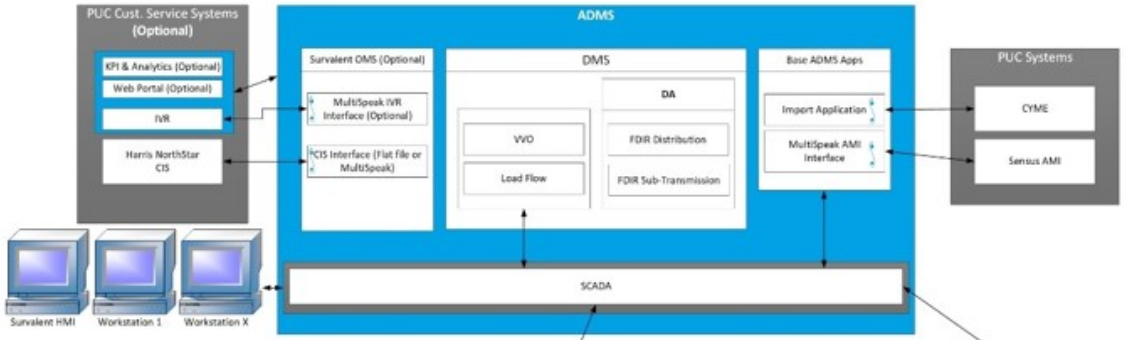
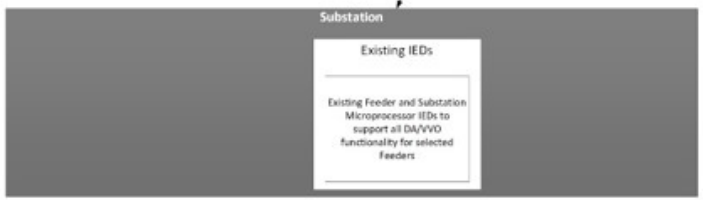
Appendix AA3-3: SSG Logical Scoping Diagram

PUC Sault Smart Grid – Logical Scoping Diagram

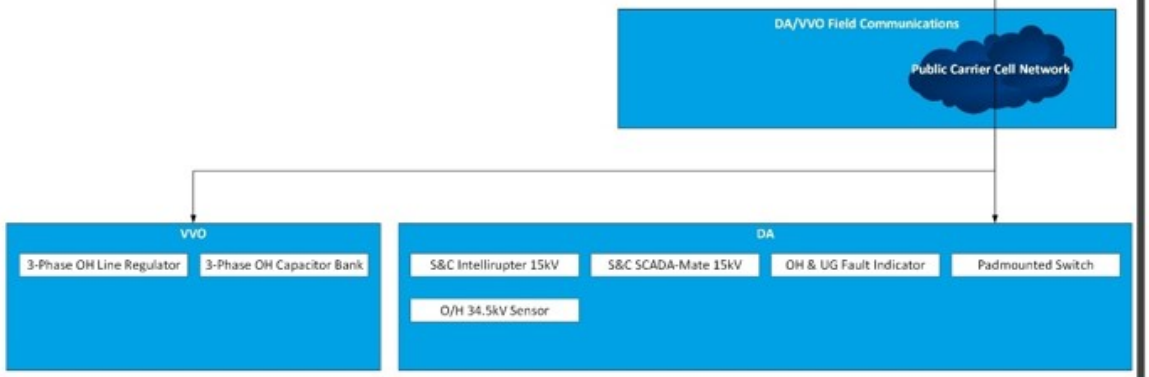
PUC Operational Domain

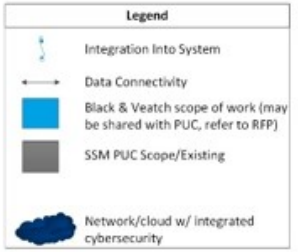


PUC Substation Domain



PUC Field Domain





Black & Veatch EPC Scoping Diagram of the Sault Smart Grid

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Appendix AA3-4: Responsibility Matrix

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Engineering					
PUC Operational Domain (Refer to Logical Scoping Diagram)					
VO1 Update CYME Model	Add	O, A	R		
VO2 Survalent Reporting	Add	O, A	R		
VO2.1 Evaluate ADMS Reporting	Add	O, A	R		
VO2.2 Evaluate OMS Reporting	Add	O, A	R		
VO2.3 Evaluate VVO Reporting	Add	O, A	R		
VO3 Evaluate CIS Integration	Add	O, A	R		
VO3.1 CIS Integration Workshop	Add	O, A	R		
VO3.2 CIS Report	Add	O, A	R		
VO4 Evaluate SCADA Data	Add	O, A	R		
VO5 Evaluate ADMS and VVO Options	Add	O, A	R		
VO6 Identify the Virtual Server Requirements	Add	O, A	R		
VO7 Evaluate Cybersecurity	Add	O, A	R		
VO8 IVR	Add	O, A	R		
VO8.1 Plan and Conduct IVR Integration Workshop	Add	O, A	R		
VO8.2 Prepare IVR Integration Report	Add	O, A	R		
VO9 CYME	Add	O, A	R		
VO9.1 Plan and Conduct CYME Integration Workshop	Baseline	O, A	R		
VO9.2 Prepare CYME Integration Report	Baseline	O, A	R		
VO10 Review Enhanced CSR/Customer Toolset	Add	O, A	R		
VO11 Review Lab Facility	Add	O, A	R		
VO12 AMI Integration	Baseline	O, A	R		
VO12.1 AMI Integration Workshop	Baseline	O, A	R		
VO12.2 AMI Integration Report	Baseline	O, A	R		
PUC Field Domain (Refer to Logical Scoping Diagram)					
VF1 Calculate Feeder and 34.5kV Performance (CMI)	Add	O, A	R		
VF2 Field Engineering	Add	O, A	R		
VF2.1 Establish Feeder Zones	Add	O, A	R		
VF2.2 Establish Bellwether Locations	Add	O, A	R		
VF2.3 Standardized Field Equipment Designs	Add	O, A	R		
VF2.3.1 Create Field Equipment Template Design Drawings	Add	O, A	R		
VF2.3.2 Create Standard Feeder Protection Schemes	Add	O, A	R		
VF2.3.3 Create Cellular Equipment Template Design Drawings	Add	O, A	R		
VF2.3.4 Field Devices Template Maintenance Plan	Add	O, A	R		
VF2.4 Perform Load Flow Analysis of Feeders	Add	O, A	R		
VF2.5 Conduct Field Survey	Add	O, A	R		
VF3 Future Reliability and Energy Savings Performance	Add	O, A	R		
VF3.1 Estimate Future VVO Savings	Add	O, A	R		
VF3.2 Estimate Future Reliability Indices	Add	O, A	R		
VF3.3 Estimate Future FDIR Cost	Add	O, A	R		
VF4 Select Feeders (12/24/36/48)	Add	R	A		
VF5 Review Permits and Public Relations	Baseline	O, A	R		
VF5.1 Local Permits	Baseline	O, A	R		
VF5.2 Develop Public Relations	Baseline	O, A	R		
PUC Organizational Domain					
VB1 Organizational Change	Add	A	R		
VB1.1 Establish Business and Functionality Requirements	Add	A	R		
VB1.2 Develop Use Case Requirements	Add	A	R		
VB1.3 Review Roles, Skills, Training, and Organizational Change Needs	Add	A	R		
VB1.3.1 Develop Field Device Training Plan	Add	A	R		
VB1.3.2 Develop Cellular Training Plan	Add	A	R		
VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans	Add	A	R		
VB1.4 Develop Communication Requirements	Add	A	R		
VB1.5 Develop Process Transition, Phasing, and Migration Plans	Add	A	R		
VB1.6 Assess Business Readiness	Add	A	R		

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Procurement					
VP1 Quote Major Materials and Equipment	Add	O, A	R		
VP1.1 Quote Survalent Software	Add	O, A	R		
VP1.2 Quote Cellular Equipment	Add	O, A	R		
VP1.3 Quote Field Equipment	Add	O, A	R		
VP1.4 Quote IVR Software	Add	O, A	R		
VP1.5 Quote Server Hardware	Add	R	O		
VP2 Establish Material Management Requirements	Add	O, A	R		
Major Task: Step 2 Engineering					
PUC Operational Domain (Refer to Logical Scoping Diagram)					
EA1 System Integration	Add	O, A	R		
EA1.1 IVR Integration	Add	O, A	R		
EA1.1.1 Design IVR Integration	Add	O, A	R		
EA1.1.2 Develop IVR Integration Software Testing Plan	Add	O, A	R		
EA1.1.3 Develop IVR Integration Training Materials	Add	O, A	R		
EA1.1.4 Develop IVR Integration Maintenance Plan	Add	O, A	R		
EA1.2 CIS Integration	Baseline	O, A	R		
EA1.2.1 Design CIS Integration	Baseline	O, A	R		
EA1.2.2 Develop CIS Integration Software Testing Plan	Baseline	O, A	R		
EA1.2.3 Develop CIS Integration Training Materials	Baseline	O, A	R		
EA1.2.4 Develop CIS Integration Maintenance Plan	Baseline	O, A	R		
EA1.3 CYME Integration	Baseline	O, A	R		
EA1.3.1 Design CYME Integration	Baseline	O, A	R		
EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)	Baseline	O, A	R		
EA1.3.3 Develop CYME Integration Training Materials	Baseline	O, A	R		
EA1.3.4 Develop CYME Integration Maintenance Plan	Baseline	O, A	R		
EA1.4 AMI Integration	Baseline	O, A	R		
EA1.4.1 Design AMI Integration	Baseline	O, A	R		
EA1.4.1.1 Finalize Bellwether Meter Selection	Baseline	O, A	R		
EA1.4.1.2 Design AMI Interface	Baseline	O, A	R		
EA1.4.2 Develop AMI Integration Software Testing Plan	Baseline	O, A	R		
EA1.4.3 Develop AMI Integration Training Materials	Baseline	O, A	R		
EA1.4.4 Develop AMI Integration Maintenance Plan	Baseline	O, A	R		
EA2 OMS	Add	O, A	R		
EA2.1 Design OMS	Add	O, A	R		
EA2.2 Design Customer Outage Web Portal	Add	O, A	R		
EA2.3 Design Internal Stakeholder Dashboard	Add	O, A	R		
EA2.4 Design Mobile Crew	Add	O, A	R		
EA2.5 Develop OMS Software Testing Plan	Add	O, A	R		
EA2.6 Develop OMS Training Materials	Add	O, A	R		
EA2.7 Develop OMS Maintenance Plan	Add	O, A	R		
EA3 ADMS	Baseline	O, A	R		
EA3.1 Define DNP3 Design Templates	Baseline	O, A	R		
EA3.2 Develop ADMS Symbol Templates	Baseline	O, A	R		
EA3.3 Additional Templates	Baseline	O, A	R		
EA3.3.1 Define Device Template Point Lists	Baseline	O, A	R		
EA3.3.2 Field Device Template Configurations	Baseline	O, A	R		
EA3.3.2.1 Create Field Device Template Configurations	Baseline	O, A	R		
EA3.3.2.2 Create Cellular Template Configuration	Baseline	O, A	R		
EA3.3.3 Field Equipment Template Testing Plans	Baseline	O, A	R		
EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment	Baseline	O, A	R		
EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans	Baseline	O, A	R		
EA3.3.3.3 Develop Template Cellular Testing Plan	Baseline	O, A	R		
EA3.3.3.4 Develop Template Communications End-to-End Testing Plan	Baseline	O, A	R		

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
EA4 SCADA Master	Baseline	O, A	R		
EA4.1 Define SCADA Master Logical Design	Baseline	O, A	R		
EA4.2 Create SCADA Master Displays and Database	Baseline	O	R		
EA4.3 Develop SCADA Master End-to-End Testing Plan	Baseline	O	R		
EA4.4 Develop SCADA and ADMS Software Testing Plan	Baseline	O, A	R		
EA4.5 Develop SCADA and ADMS Master Training Materials	Baseline	O, A	R		
EA4.6 Develop SCADA and ADMS Master Maintenance Plan	Baseline	O, A	R		
EA5 IVR	Add	O, A	R		
EA5.1 Define IVR Logical Design	Add	O, A	R		
EA5.2 Develop IVR Integration	Add	O	R		
EA5.3 Perform IVR Configuration	Add	O	R		
EA5.4 Develop IVR Software Testing Plan	Add	O	R		
EA5.5 Develop IVR Training Materials	Add	O, A	R		
EA5.6 Develop IVR Maintenance Plan	Add	O, A	R		
EA6 Develop Cut-Over Plan	Add	O, A	R		
EA7 Lab Facility	Add	O, A	R		
EA7.1 Design Lab Facility and Test System	Add	O, A	R		
EA7.2 Create Lab Testing Plan	Add	O, A	R		
PUC Substation Domain (Placeholder)					
PUC Field Domain (Refer to Logical Scoping Diagram)					
EF1 Detailed Design for Field Equipment	Baseline	O, A	R		
EF1.1 Create Site-Specific Work Orders	Baseline	O, A	R		
EF1.2 Perform Protection Coordination Studies	Baseline	O, A	R		
EF1.3 Create Configuration Files	Baseline	O, A	R		
EF1.4 Create Component Testing Plans	Baseline	O, A	R		
EF1.5 Create Field Equipment Training Materials	Baseline	O, A	R		
EF1.5.1 Develop Field Device Training Materials	Baseline	O, A	R		
EF1.5.2 Develop Cellular Training Materials	Baseline	O, A	R		
EF2 Design Field Area Network	Baseline	O, A	R		
EF3 Permits and Public Relations	Baseline	R	A		
EF3.1 Obtain Local Permits	Baseline	R			
EF3.2 Perform Public Relations	Baseline	R			
PUC Organizational Domain					
EO1 Organizational Change Management	Add	O	R		
EO1.1 Review In-Scope Processes	Add	O	R		
EO1.2 Prepare Workshop Materials	Add	O	R		
EO1.3 Conduct Workshops	Add	O	R		
EO1.4 Transition to New Operational Processes	Add	O	R		
EO2 Training	Add	O	R		
EO2.1 Perform IVR Integration Training	Add	O	R		
EO2.2 Perform CIS Integration Training	Add	O	R		
EO2.3 Perform CYME Integration Training	Add	O	R		
EO2.4 Perform AMI Integration Training	Add	O	R		
EO2.5 Perform OMS Training	Add	O	R		
EO2.6 Perform Field Equipment Training	Add	O	R		
EO2.7 Perform SCADA and ADMS Master Training	Baseline	O	R		
EO2.8 Perform IVR Training	Add	O	R		
Major Task: Step 2 Procurement					
Purchasing					
PR1 Major Materials and Equipment	Baseline				
PR1.1 Purchase Survalent Software	Baseline	O	R		
PR1.2 Purchase Field Equipment	Baseline	O	R		
PR1.3 Purchase Cellular Equipment	Baseline	O	R		
PR1.4 Purchase IVR Software	Add	O	R		
PR1.5 Purchase Server Hardware	Baseline	R	A		
PR2 Purchase All Other Materials and Equipment	Baseline	R	A		
PR3 Establish and Manage Inventory and Warehouse	Add	O, R	R, O		
PR3.1 Establish and Manage Inventory and Warehouse for Major Materials	Add	O	R		
PR3.2 Establish and Manage Inventory and Warehouse for All Other Materials	Add	R	O		
PR4 Inspect and Verify OEM Specs	Baseline	O	R		

Sault Smart Grid Project

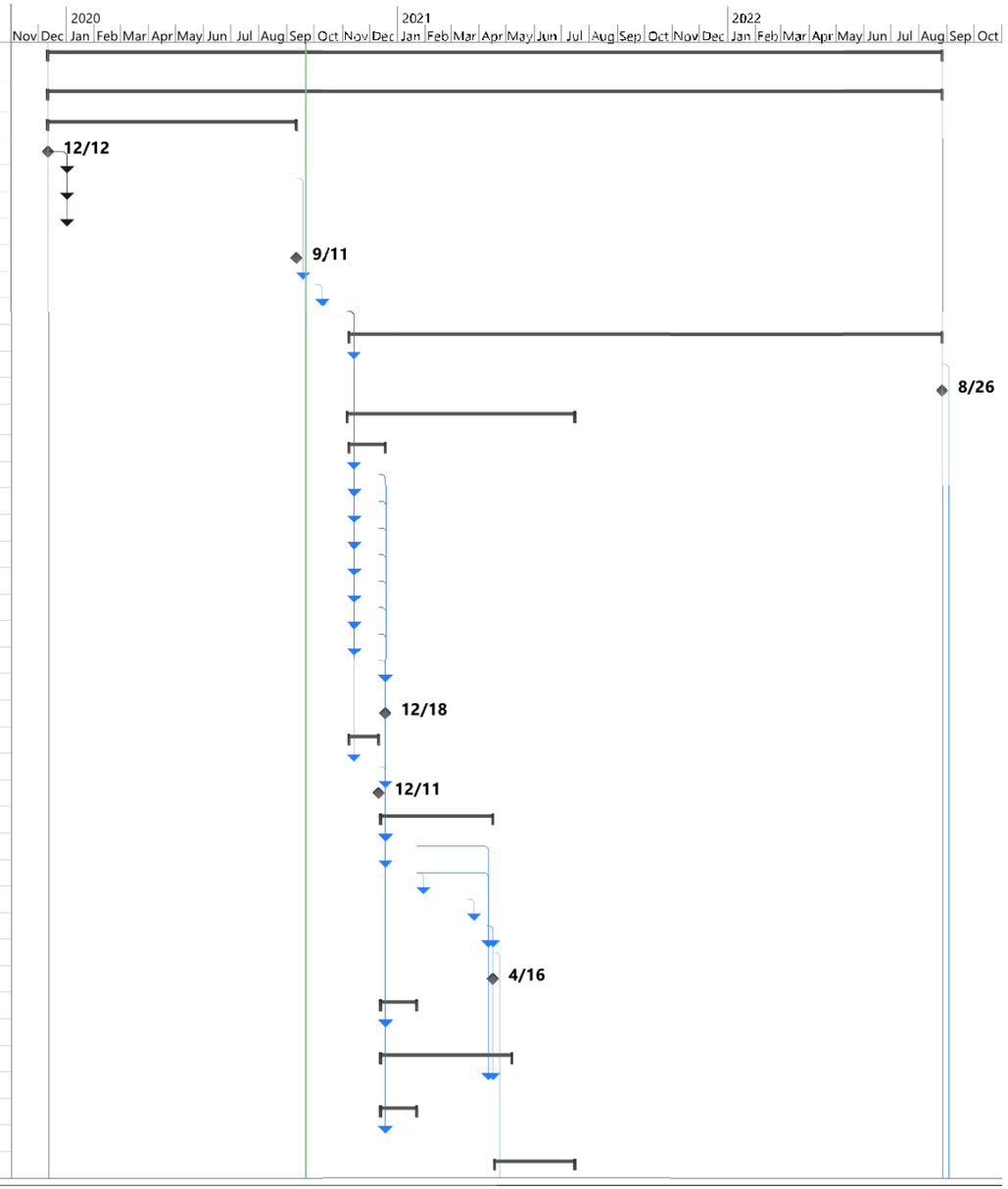
Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Staging and Testing					
ST1 Stage Major Systems and Test	Baseline	O, A, R	A, R		
ST1.1 Install the Lab Test System	Add	R, O	A		
ST1.2 Perform Lab Testing	Add	O, A	R		
ST1.3 Delivery of Lab to the PUC	Add	O	R		
ST1.4 Install Lab at the PUC	Add	R			
ST2 Kit and Prepare for Field	Add	O	R		
Major Task: Step 2 Construction/Implementation					
Construction Domain					
CN1 Construction Activities and Management	Baseline	O	R		
CN1.1 Perform Pre-Mobilization/Mobilization Activities	Baseline	O	R		
CN1.2 Create Turnover Packages	Baseline	O	R		
CN1.3 Create Commissioning Plan	Baseline	O	R		
CN1.4 Manage Construction	Baseline	O	R		
CN1.5 Manage Commissioning	Baseline	O	R		
CN1.6 Perform Closeout Activities	Baseline	O	R		
PUC Operational Domain (Refer to Logical Scoping Diagram)					
CO1 Migrate SCADA to ADMS Server	Baseline	O, A	R		
CO2 Construction of the Lab Facility	Baseline	O, A	R		
CO3 Perform Communication Testing	Baseline	O, A	R		
CO4 Cut-Over from Test System to Production System	Baseline	O, A	R		
CO5 Perform IVR Go-Live	Add	O, A	R		
PUC Substation Domain (Refer to Logical Scoping Diagram)					
CS1 Install Communications to and at Substations (placeholder)	Baseline	R	A		
CS2 Update Substation IEDs (placeholder)	Baseline	R	A		
PUC Field Domain (Refer to Logical Scoping Diagram)					
CF1 Install Field Equipment	Baseline	R, A	A, R		
CF1.1 Construct Field Equipment	Baseline	R, A	A, R		
CF1.2 Component Test Field Equipment	Baseline	R, A	A, R		
Major Task: Project Management					
Project Management					
PM1 Project Kickoff Meeting	Baseline		R		
PM1.1 Organizational Structure	Add		R		
PM1.2 Staffing and Resources	Add		R		
PM1.3 Stakeholders	Add		R		
PM1.4 Reporting Methodology	Add		R		
PM1.5 Schedule	Add		R		
PM1.6 Scope and Change Management	Add		R		
PM1.7 Communications Plan	Add		R		
PM2 Management Status Meetings	Add		R		
PM3 Project Steering Committee Meetings	Add		R		
PM4 Change Management	Add		R		
PM5 Overall Schedule, Phases, and Milestones	Baseline		R		
PM5.1 Overall Project Schedule	Baseline		R		
PM5.2 Engineering Schedule	Add		R		
PM5.3 Procurement Schedule	Add		R		
PM5.4 Construction Schedule	Add		R		
PM5.5 Schedule Consolidation	Add		R		
PM5.6 Execution Logistics: Scheduling access, safety escorts, Training	Add		R		
PM6 Risk Management	Add		R		
PM7 Budget Planning & Forecasting	Baseline		R		
PM8 Quality Assurance	Baseline		R		
PM9 Project Execution Plan (PEP)	Add		R		

R = Responsible; A = Assist; O=Oversight (includes Review/Approve), TBD=To Be Determined

Appendix AA3-5: Project Schedule

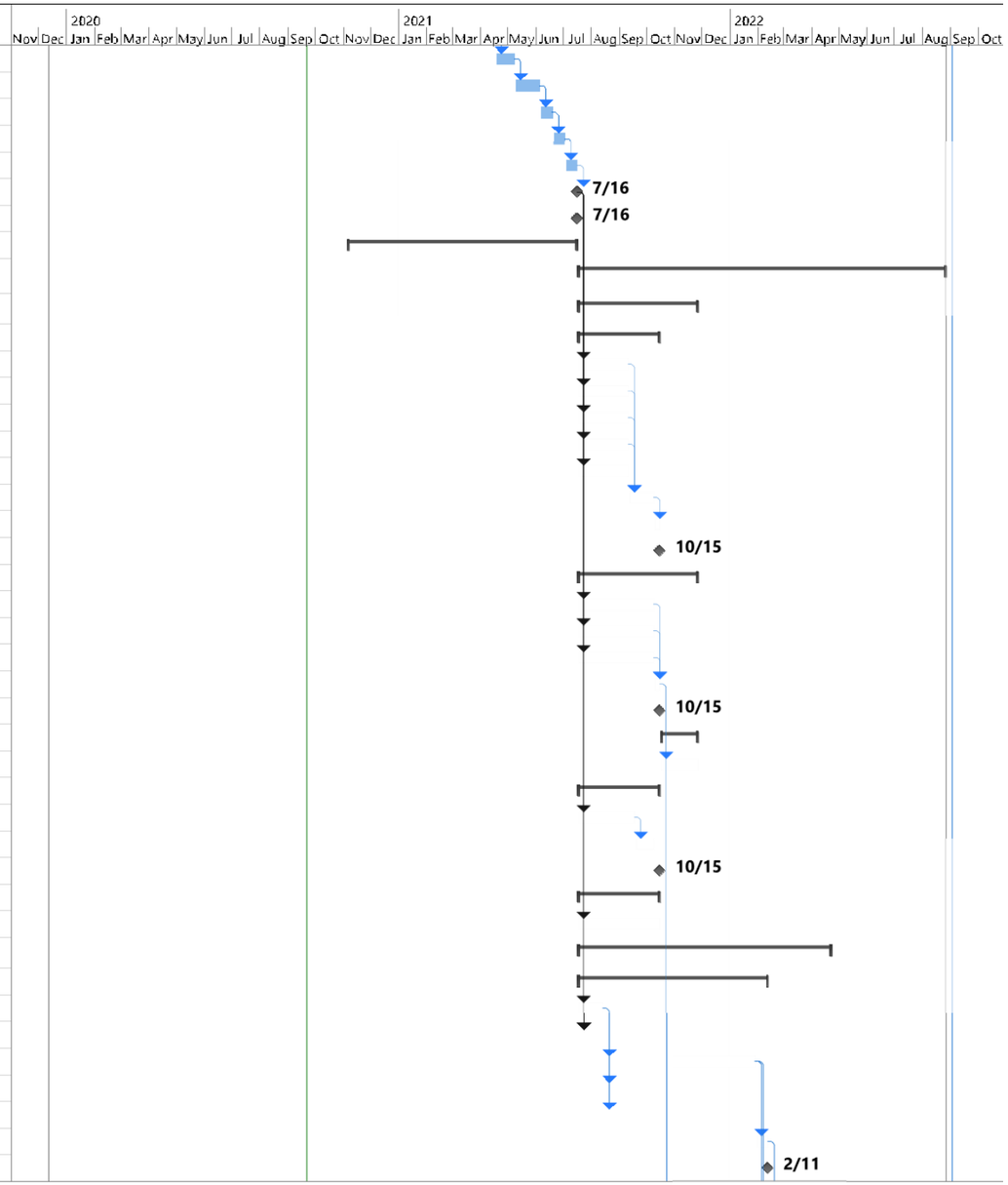
ID	Task Name	Duration	Start	Finish
1	**PUC Sault Smart Grid Project**	**707 days**	**Thu 12/12/19**	**Fri 8/26/22**
2	**Step 1: Smart Start & Contract Negotiations**	**707 days**	**Thu 12/12/19**	**Fri 8/26/22**
3	**SMARTStart**	**197 days**	**Thu 12/12/19**	**Fri 9/11/20**
4	Award Notification	0 days	Thu 12/12/19	Thu 12/12/19
5	Contract Agreement Negotiations	182 days	Thu 1/2/20	Fri 9/11/20
6	Scope & Price Development & Reviews	182 days	Thu 1/2/20	Fri 9/11/20
7	Project Execution Plan	182 days	Thu 1/2/20	Fri 9/11/20
8	**Expenses**	**0 days**	**Fri 9/11/20**	**Fri 9/11/20**
12	Execute Contract	15 days	Mon 9/14/20	Fri 10/2/20
13	NTP-Upfront Engineering	25 days	Mon 10/5/20	Fri 11/6/20
14	**PMO**	**470 days**	**Mon 11/9/20**	**Fri 8/26/22**
15	Project Management	470 days	Mon 11/9/20	Fri 8/26/22
16	**Expenses**	**0 days**	**Fri 8/26/22**	**Fri 8/26/22**
20	**Step 1: Upfront Engineering**	**180 days**	**Fri 11/6/20**	**Fri 7/16/21**
21	**PUC Operational Domain Tasks**	**30 days**	**Mon 11/9/20**	**Fri 12/18/20**
22	VO1 Update CYME Model-P	25 days	Mon 11/9/20	Fri 12/11/20
23	VO2 Evaluate Survalent Reporting	25 days	Mon 11/9/20	Fri 12/11/20
24	VO3 Evaluate CIS Integration	25 days	Mon 11/9/20	Fri 12/11/20
25	VO4 Evaluate SCADA Data	25 days	Mon 11/9/20	Fri 12/11/20
26	VO5 Evaluate ADMS and VVO Options	25 days	Mon 11/9/20	Fri 12/11/20
27	VO6 Develop ADMS, OMS, and VVO Training Scope and Schedule	25 days	Mon 11/9/20	Fri 12/11/20
28	VO7 Identify the Virtual Server Requirements	25 days	Mon 11/9/20	Fri 12/11/20
29	VO8 Evaluate Cyber Security	25 days	Mon 11/9/20	Fri 12/11/20
30	Review	5 days	Mon 12/14/20	Fri 12/18/20
31	**Expenses**	**0 days**	**Fri 12/18/20**	**Fri 12/18/20**
35	**Subcontractor**	**25 days**	**Mon 11/9/20**	**Fri 12/11/20**
36	Survalent	25 days	Mon 11/9/20	Fri 12/11/20
37	Performance Modeling-BV	0 days	Fri 12/11/20	Fri 12/11/20
38	**PUC Field Domain Tasks**	**90 days**	**Mon 12/14/20**	**Fri 4/16/21**
39	VF1 Calculate Feeder and 34.5kV Performance (CMI)	30 days	Mon 12/14/20	Fri 1/22/21
40	VF2 Field Engineering: Feeders 1-48	30 days	Mon 12/14/20	Fri 1/22/21
41	VF3 Estimate Future Reliability and Energy Savings Performance-P	40 days	Mon 1/25/21	Fri 3/19/21
42	VF4 Select Feeders (12/24/36/48)	15 days	Mon 3/22/21	Fri 4/9/21
43	Review	5 days	Mon 4/12/21	Fri 4/16/21
44	**Expenses**	**0 days**	**Fri 4/16/21**	**Fri 4/16/21**
48	**Subcontractor**	**30 days**	**Mon 12/14/20**	**Fri 1/22/21**
49	Performance Modeling-BV	30 days	Mon 12/14/20	Fri 1/22/21
50	**PUC Organizational Domain Tasks**	**105 days**	**Mon 12/14/20**	**Fri 5/7/21**
51	VB1 Assess Organizational Change & Review	20 days	Mon 4/12/21	Fri 5/7/21
52	**Subcontractor**	**30 days**	**Mon 12/14/20**	**Fri 1/22/21**
53	Change Management Consultant-MC	30 days	Mon 12/14/20	Fri 1/22/21
54	**Procurement: Balance of Work Price Development**	**65 days**	**Mon 4/19/21**	**Fri 7/16/21**



Project: PUC SSG Project Sched
Date: Tue 9/22/20

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

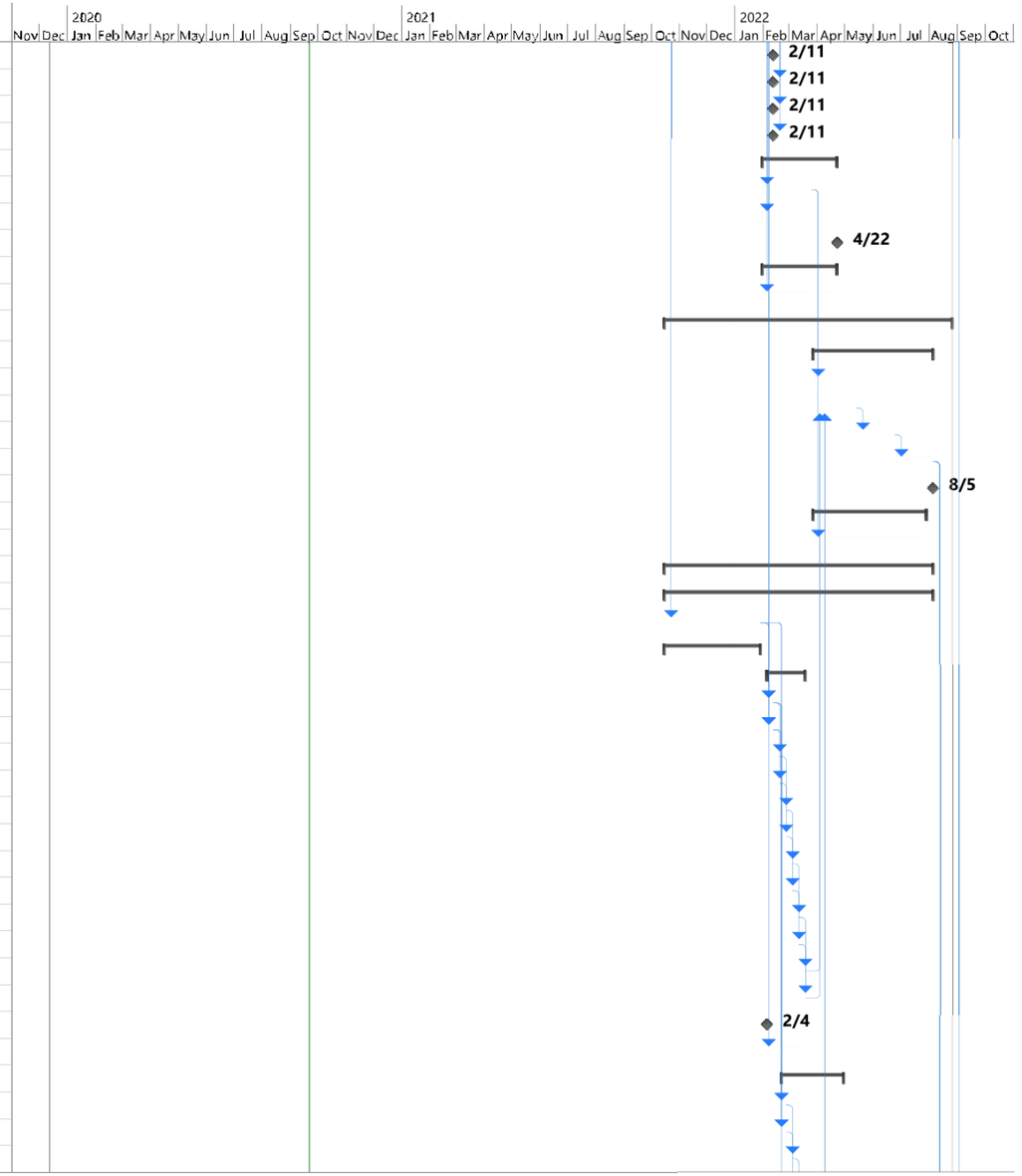
ID	Task Name	Duration	Start	Finish
55	VP1 Develop Construction Packages & Specifications	15 days	Mon 4/19/21	Fri 5/7/21
56	VP1 Submit Construction Packages for Bid/Quotes to Contractors & Suppliers	20 days	Mon 5/10/21	Fri 6/4/21
57	Review Bid Packages	10 days	Mon 6/7/21	Fri 6/18/21
58	Develop Firm Price	10 days	Mon 6/21/21	Fri 7/2/21
59	Review with PUC, and Finalize Balance of Work Price	10 days	Mon 7/5/21	Fri 7/16/21
60	Owner Submits NTP for Balance of Work to Contractor	0 days	Fri 7/16/21	Fri 7/16/21
61	**Expenses**	**0 days**	**Fri 7/16/21**	**Fri 7/16/21**
65	**Other Expenses**	**180 days**	**Fri 11/6/20**	**Fri 7/16/21**
68	**Step 2: Balance of Work**	**290 days**	**Mon 7/19/21**	**Fri 8/26/22**
69	**Step 2: Engineering**	**95 days**	**Mon 7/19/21**	**Fri 11/26/21**
70	**PUC Operational Domain Tasks**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
71	EA1 System Integration	40 days	Mon 7/19/21	Fri 9/10/21
72	EA2 OMS	40 days	Mon 7/19/21	Fri 9/10/21
73	EA3 ADMS	40 days	Mon 7/19/21	Fri 9/10/21
74	EA4 SCADA Master	40 days	Mon 7/19/21	Fri 9/10/21
75	EA5 IVR	40 days	Mon 7/19/21	Fri 9/10/21
76	EA6 Cut-Over Plans	20 days	Mon 9/13/21	Fri 10/8/21
77	Review	5 days	Mon 10/11/21	Fri 10/15/21
78	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
82	**PUC Field Domain Tasks**	**95 days**	**Mon 7/19/21**	**Fri 11/26/21**
83	EF1 VVO & DA Detailed Design (1-48)	60 days	Mon 7/19/21	Fri 10/8/21
84	EF2 Design VV0 DA Field Area Network	60 days	Mon 7/19/21	Fri 10/8/21
85	EF3 Siting/Permitting	60 days	Mon 7/19/21	Fri 10/8/21
86	Review	5 days	Mon 10/11/21	Fri 10/15/21
87	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
91	**Subcontractor**	**30 days**	**Mon 10/18/21**	**Fri 11/26/21**
92	Protection Analysis-BV	30 days	Mon 10/18/21	Fri 11/26/21
93	**PUC Organizational Domain Tasks**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
94	EO1 Organizational Change Management	45 days	Mon 7/19/21	Fri 9/17/21
95	EO2 Training	15 days	Mon 9/20/21	Fri 10/8/21
96	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
99	**Subcontractor**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
100	Change Management Consult MC	65 days	Mon 7/19/21	Fri 10/15/21
101	**Step 2: Procurement**	**200 days**	**Mon 7/19/21**	**Fri 4/22/22**
102	**Purchase Equipment**	**150 days**	**Mon 7/19/21**	**Fri 2/11/22**
103	Negotiate Supplier Contracts	20 days	Mon 7/19/21	Fri 8/13/21
104	Negotiate Sub-Contractor Contracts	20 days	Mon 7/19/21	Fri 8/13/21
105	PR1 Order Long Lead Equipment: Regulators, Reclosers, etc.	120 days	Mon 8/16/21	Fri 1/28/22
106	PR2 Order Materials: Poles, Make Ready, etc	40 days	Mon 8/16/21	Fri 10/8/21
107	PR3 Warehouse & Inventory	50 days	Mon 8/16/21	Fri 10/22/21
108	PR4 Inspect & Verify OEM Equipment & Specs	10 days	Mon 1/31/22	Fri 2/11/22
109	**Expenses**	**0 days**	**Fri 2/11/22**	**Fri 2/11/22**



Project: PUC SSG Project Sched
Date: Tue 9/22/20

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

ID	Task Name	Duration	Start	Finish
112	**Equipment & Materials**	**0 days**	**Fri 2/11/22**	**Fri 2/11/22**
113	Survalent Equipment and Services	0 days	Fri 2/11/22	Fri 2/11/22
114	Major Equipment	0 days	Fri 2/11/22	Fri 2/11/22
115	Misc Materials	0 days	Fri 2/11/22	Fri 2/11/22
116	**Staging, Kitting and Testing Tasks**	**60 days**	**Mon 1/31/22**	**Fri 4/22/22**
117	ST1 Stage Major Systems and Test	40 days	Mon 1/31/22	Fri 3/25/22
118	ST2 Kit and Prepare for Field	60 days	Mon 1/31/22	Fri 4/22/22
119	**Expenses**	**0 days**	**Fri 4/22/22**	**Fri 4/22/22**
123	**Subcontractor**	**60 days**	**Mon 1/31/22**	**Fri 4/22/22**
124	Subcontractor 1	60 days	Mon 1/31/22	Fri 4/22/22
125	**Step 2: Construction**	**225 days**	**Fri 10/15/21**	**Fri 8/26/22**
126	**PUC Operational Domain Tasks**	**95 days**	**Mon 3/28/22**	**Fri 8/5/22**
127	CO1 Construction of Test System	15 days	Mon 3/28/22	Fri 4/15/22
128	CO2 Survalent SCADA End-to-End Testing	30 days	Mon 4/4/22	Fri 5/13/22
129	CO3 Cut-Over from Test System to Production System	30 days	Mon 5/16/22	Fri 6/24/22
130	CO4 IVR Go-Live	30 days	Mon 6/27/22	Fri 8/5/22
131	**Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
135	**Subcontractor**	**90 days**	**Mon 3/28/22**	**Fri 7/29/22**
136	Survalent	90 days	Mon 3/28/22	Fri 7/29/22
137	**PUC Field Domain Tasks**	**210 days**	**Fri 10/15/21**	**Fri 8/5/22**
138	**CF1 Install Field VVO & DA Equipment**	**210 days**	**Fri 10/15/21**	**Fri 8/5/22**
139	Make Ready Work	75 days	Mon 10/18/21	Fri 1/28/22
140	**Expenses**	**75 days**	**Fri 10/15/21**	**Fri 1/28/22**
144	**Substation VVO Feeders 1-48 Install/Functional & Substantial Testing**	**30 days**	**Fri 2/4/22**	**Fri 3/18/22**
145	Sub 1 Feeders 1-4	5 days	Mon 2/7/22	Fri 2/11/22
146	Sub 2 Feeders 1-4	5 days	Mon 2/7/22	Fri 2/11/22
147	Sub 3 Feeders 1-4	5 days	Mon 2/14/22	Fri 2/18/22
148	Sub 4 Feeders 1-4	5 days	Mon 2/14/22	Fri 2/18/22
149	Sub 5 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
150	Sub 6 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
151	Sub 7 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
152	Sub 8 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
153	Sub 9 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
154	Sub 10 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
155	Sub 11 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
156	Sub 12 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
157	**Expenses**	**0 days**	**Fri 2/4/22**	**Fri 2/4/22**
161	Subcontractor 1	30 days	Mon 2/7/22	Fri 3/18/22
162	**Substation DA Feeders 1-48 Install/Functional & Substantial Testing**	**50 days**	**Mon 2/21/22**	**Fri 4/29/22**
163	Sub 1 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
164	Sub 2 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
165	Sub 3 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22



Project: PUC SSG Project Sched
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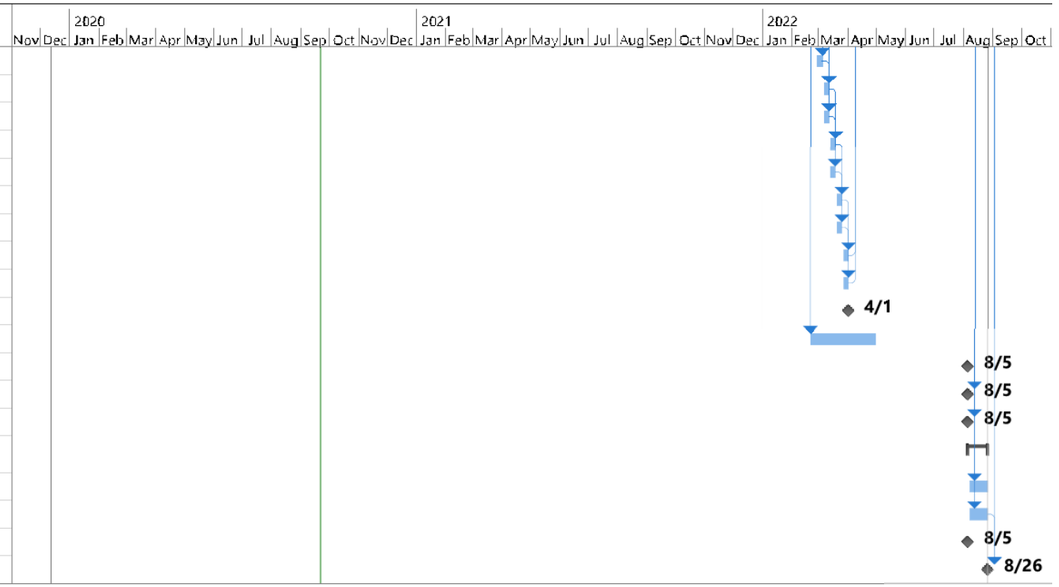
Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

ID	Task Name	Duration	Start	Finish
166	Sub 4 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
167	Sub 5 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
168	Sub 6 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
169	Sub 7 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
170	Sub 8 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
171	Sub 9 Feeders 1-4	5 days	Mon 3/21/22	Fri 3/25/22
172	Sub 10 Feeders 1-4	5 days	Mon 3/21/22	Fri 3/25/22
173	Sub 11 Feeders 1-4	5 days	Mon 3/28/22	Fri 4/1/22
174	Sub 12 Feeders 1-4	5 days	Mon 3/28/22	Fri 4/1/22
175	**Expenses**	**0 days**	**Fri 4/1/22**	**Fri 4/1/22**
179	Subcontractor 2	50 days	Mon 2/21/22	Fri 4/29/22
180	**Other Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
181	Corporate Taxes	0 days	Fri 8/5/22	Fri 8/5/22
182	Work Permits	0 days	Fri 8/5/22	Fri 8/5/22
183	**Project CloseOut & Final Completion**	**15 days**	**Fri 8/5/22**	**Fri 8/26/22**
184	Punch List Items	15 days	Mon 8/8/22	Fri 8/26/22
185	As-Builts & Final Completion	15 days	Mon 8/8/22	Fri 8/26/22
186	**Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
190	Project Complete	0 days	Fri 8/26/22	Fri 8/26/22



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Summary	Inactive Summary	Manual Summary	External Milestone		

Appendix AA3-6: EPC Pricing Summary

Sault Smart Grid Project
EPC Contract Pricing

Sault Smart Grid Project

Pricing

	Step	Price
Major Task: Step 1 PMO Engineering & EPC, Engineering	1	
Engineering		
[redacted]		
Total Step 1: PMO (May 20 - Feb. 22) + SMARTStart + Engineering	1	$ 5,086,378

[redacted]		
Major Task: Step 1 PMO & Eng Price	1	$ 5,086,378
Major Task: Step 2 EPC ROM Budget	2	$22,658,667
Total Step 1 & Step 2	1,2	$27,745,044

Appendix AA3-7: EPC Contract

EPC Contract
(Engineering, Procurement and Construction Contract)
in respect of RFP No. SSG2019

Between

PUC Distribution Inc.

- and -

Overland Contracting Canada Inc.

Effective Date: October 7, 2020

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ADDENDA

Engineering, Procurement and Construction Contract

This *Contract* is made effective this 7th day of October, 2020

Between

Overland Contracting Canada Inc.
the "*Contractor*"

- and -

PUC Distribution Inc.
the "*Owner*"

Introduction:

A. The *Contractor* has agreed to perform the *Work* for the *Owner* as set out in this *Contract*, on the terms and conditions set forth in this *Contract*;

IN CONSIDERATION of the mutual covenants and conditions contained herein, the parties agree as follows:

Article 1 - Definitions and Appendices

1.1 The following terms, wherever capitalised in the *Contract*, or in any document produced pursuant to the terms of the *Contract*, shall have the following meanings:

(a) *Affiliate* means an "affiliate" as such term is defined in the Business Corporations Act (Ontario);

(b) *Appendix* or *Appendices*, as the case may be, means one or more of the schedules attached to and incorporated in this *Contract* as set forth in Section 1.2;

(c) *As-Built Drawings* means the controlled and complete set of documents upon which the *Contractor* records each and every instance of differences between the *Work* as executed and the *Work* as designed and depicted in the documents issued by the *Contractor* for *Construction Work*;

(d) *Balance of Work* means the *Work* other than the *Upfront Engineering Services*;

(e) *Balance of Work Fixed Price* has the meaning given in Appendix B – Compensation;

(f) *Change* means any change in, addition to, or deletion from Appendix A – SSG Scope of Work, the *Owner's Requirements*, the *Owner's Specified Materials and Subcontractors*, the *Milestones*, or the *Contract Time*;

(g) *Change Directive* means a written instruction from the *Owner* directing a *Change*;

(h) *Change of Control* means, with respect to the *Contractor*:

(i) any change in ownership, whether beneficial or otherwise, of any of the shares or units of ownership of *Contractor*, or in the direct or indirect power to vote or transfer any of the shares or units of ownership of *Contractor*

(ii) any other change in respect of the power to elect a majority of the directors of *Contractor* or otherwise control the decisions made on behalf of *Contractor*; or

(iii) any other change of direct or indirect power or authority through any contractual right or other power or interest with or over *Contractor* to influence, direct, cause to change or prevent from changing the approval of a decision, direction of the management, actions or policies of *Contractor*;

where the effect of such change is to result in control of any of the following no longer being with the *Guarantor*: (A) the decisions made by or on behalf of *Contractor* or (B) the power or authority to influence, direct, cause to change or prevent from changing the approval of a decision, direction of the management, actions or policies of *Contractor*;

(i) *Change Order* means a written order signed by both the *Contractor* and the *Owner* authorizing a *Change*;

(j) *Change Quotation* means a written quotation from the *Contractor* for an adjustment in the *Contract Time, Milestones* or the *Compensation*, or both;

(k) *Commissioning after Functional or Substantial Completion* means those commissioning duties of the *Owner* and of the *Contractor* that shall take place after *Functional Completion* or *Substantial Completion* and which are described in the *Owner's Requirements* and allocated to either the *Owner* or the *Contractor*;

(l) *Commissioning before Functional or Substantial Completion* means those commissioning duties of the *Owner* and of the *Contractor* that shall take place before *Functional Completion* or *Substantial Completion* and which are described in the *Owner's Requirements* and allocated to either the *Owner* or the *Contractor*;

(m) *Compensation* means the compensation which the *Owner* shall pay for performance of the *Work* in accordance with Appendix B – Compensation;

(n) *Confidential Information* means all information relating to the *Work* and any process or technology relating thereto, and information relating to the nature of the *Contractor's* and the *Owner's* business and affairs, which either party directly or indirectly receives or acquires from the other party, or the other party's representative, either in writing or verbally, including information in the *Contract*, or through observation of the *Owner's Site*, the *Work Site*, the *Work* or work performed by *Other Contractors*, except information falling into any one or more of the following categories:

(i) information which the receiving party can show was in its possession on a non-confidential basis before receipt or acquisition of the information from the other party;

(ii) information which is lawfully in the public domain at the time of the receiving party's receipt or acquisition of the information from the other party, other than from the *Owner's Requirements* or through the process of proposal calls or performing the *Work*;

(iii) information which, after the receiving party's receipt or acquisition of the information from the other party, becomes part of the public domain through no act of the receiving party or of any third party under an obligation of confidence with respect to such information, but only after such information becomes part of the public domain; or

(iv) information which, after receipt or acquisition of the information from the other party, is lawfully obtained by the receiving party from a third party, but only after such information is so received or acquired, and provided such third party is under no obligation of confidence with respect to such information.

(o) *Construction Work* means delivery, fabrication, assembly, construction, testing, commissioning and correction, including professional and technical personnel, labour, supervision, administration, materials, transportation, supplies, tools, equipment, and such other work and materials necessary to be performed or supplied to meet the requirements of the *Contract*, including any work which is not expressly described in the *Contract* but which is nevertheless necessary for the proper execution of the *Work*, but does not include *Engineering Services*;

(p) *Contemplated Change Notice* means a written notice from the *Owner* advising the *Contractor* that the *Owner* is contemplating a *Change*;

(q) *Contract* means:

(i) this Engineering, Procurement and Construction Contract;

(ii) *Change Orders* and *Change Directives*;

(iii) *Owner's Requirements*;

(iv) *Execution Plan*; and

(v) other documents which come into existence and are incorporated into the *Contract* pursuant to the terms of this *Contract*;

(r) *Contract Time* means, as the context requires, the period of time:

(i) from the date of the *Notice to Proceed with Upfront Engineering* to the *Scheduled Completion Date for Upfront Engineering*;

(ii) from the date of the *Notice to Proceed with Balance of Work* to the *Scheduled Final Completion Date*; or

(iii) from the date of the *Notice to Proceed with Upfront Engineering* or *Notice to Proceed with Balance of Work*, as applicable, to a *Milestone Date*;

(s) *Contractor* means Overland Contracting Canada Inc.;

(t) *Contractor's Representative* means that person identified as such in Section 48.2, or an approved replacement;

(u) *Deficiency* means any portion of the *Work* that has not been performed in accordance with the *Owner's Requirements*, the *Contract* or the *Law*;

(v) *Engineering Services* means those services described in the *Owner's Requirements* and provided by the *Contractor* for the design, planning and engineering of the *Project*, but does not include *Construction Work*;

(w) *Engineering Submissions* means the drawings, reports, documents, plans, software, formulae, calculations, and other data prepared or obtained by the Contractor relating to the *Engineering Services* and requiring review by the *Owner* pursuant to the *Review Procedure*;

(x) *Epidemic* means a virus, disease or contagion, including COVID-19, that results in delay to the *Work* or an increase in the price of labour, material, or equipment used in the performance of the *Work*; provided that the *Compensation*, the *Contract Time* and any schedule prepared by the *Contractor* hereunder shall, at the time it is agreed to or prepared, take into account any delay or price increase that may be reasonably be expected to result from an *Epidemic*, to the best of *Contractor's* knowledge at such time;

(y) *Event of Force Majeure* means any occurrence, other than the financial capability of a party or an event constituting a delay under Article 32 - Delays Caused by the Contractor or Article 33 - Delays not Caused by the Contractor, which prevents or delays a party from performing its obligations under the *Contract* (except an obligation to pay any amount) within the time required for the performance of such obligation and which is beyond the control and without the fault or negligence of the party relying on such occurrence, and which by the exercise of reasonable diligence that party could not, at the time the *Contract* was executed, have reasonably contemplated happening and which at the time of such occurrence, is beyond the reasonable control of the party required by the *Contract* to perform such obligation and such party is unable to reasonably prevent or provide against such occurrence;

(z) *Execution Plan* means the programme developed by the *Contractor* for the *Work* in accordance with Section 5.2 and which shall be updated from time to time as may be required by the *Owner* and which shall include, but not be limited to:

(i) the organisation to be established by the *Contractor* for carrying out the *Work*, including, but not limited to, the identities and curriculum vitae of

Key Personnel, or if not yet identified, then the titles of the positions that will be held by *Key Personnel*;

(ii) the sequences and methods for the performance of the *Work*; and

(iii) a detailed schedule with dates and critical path for the completion of *Milestones* by the *Milestone Dates*;

(aa) *Facilities* means the physical works engineered, procured and constructed as a result of the *Work* being performed;

(bb) *Final Completion Notice* means that notice in the form contained in Appendix F – Forms issued by the *Owner* to the *Contractor* pursuant to Section 21.2 certifying completion and acceptance of the *Work* under the *Contract*;

(cc) *Fixed Price* has the meaning given to it in Appendix B – Compensation;

(dd) *Functional Completion* means that date when a *System*:

(i) has passed the required *Performance Tests* that are stipulated in the *Owner's Requirements* to be performed before *Functional Completion*; and

(ii) is certified by the *Owner's Representative* pursuant to Section 20.5 as being complete or ready to be put into service, or being used for the purpose intended and a *Functional Completion Certificate* is issued;

(ee) *Functional Completion Certificate* means that notice, in the form attached hereto as Appendix F – Forms, issued by the *Owner* to the *Contractor* pursuant to Section 20.5, certifying achievement of *Functional Completion* and identifying the date that the *Owner* takes over the *System*;

(ff) *Goods* means any goods, supplies, materials or equipment required as part of the *Work*, or to perform the *Work*, and which are supplied or fabricated by the *Contractor*;

(gg) *Guarantor* [redacted]

(hh) *Hazardous Material* means any substances which are hazardous to persons, animals, property or the environment and includes hazardous substances, hazardous waste, ozone depleting substances and dangerous goods, all as identified or defined under applicable law, as well as any prescribed product under the Nuclear Safety and Control Act (Canada);

(ii) *Key Personnel* means the *Contractor's* key personnel for the *Work* identified in Appendix H – Key Personnel , or if not determined before the execution of this *Contract*, identified in an organisational chart in accordance with Article 16 - Key Personnel and approved by the *Owner*;

(jj) *Law* means the common law, the law of equity and all federal or provincial statutes or municipal by-laws and all regulations, orders, directives, permits and licenses

thereunder, which apply to or otherwise affect the *Work*, the *Owner* or the *Contractor* with respect to the *Work*, or the property of the *Owner* or the *Contractor*, real or personal, including, but not limited to, all environmental, occupational, health and safety laws;

(kk) *Liquidated Damages* mean the *Liquidated Damages for Performance* and the *Liquidated Damages for Delay*;

(ll) *Liquidated Damages for Delay* mean those damages which shall be payable by the *Contractor* in the event the *Work* is not completed in the *Contract Time* and which shall be in accordance with the parameters set out in Article 22 - Liquidated Damages;

(mm) *Liquidated Damages for Performance* mean those damages which shall be payable by the *Contractor* in the event the *Performance Guarantees* are not met and which shall be in accordance with the parameters set out in Article 22 - Liquidated Damages;

(nn) *Maximum Price* means the amount set out in Appendix B – Compensation which represents the maximum amount the *Owner* will pay for performance of the *Balance of the Work*;

(oo) *Milestone* means a milestone that the *Contractor* must meet as set forth in the *Owner's Requirements*;

(pp) *Milestone Date* means the date by which a *Milestone* must be met as set forth in the *Owner's Requirements*;

(qq) *Notice to Proceed* means, as the context requires, either of the *Notice to Proceed with Balance of Work* or *Notice to Proceed with Upfront Engineering*;

(rr) *Notice to Proceed with Balance of Work* means the agreement between the parties for the *Contractor* to commence the *Balance of Work* and setting out such other terms as the parties may agree, including those set out in Article 4 - Notice to Proceed with Balance of Work;

(ss) *Notice to Proceed with Upfront Engineering* means the notice to proceed, in the form set out in Appendix F – Forms, issued by the *Owner* authorizing the *Contractor* to commence the *Upfront Engineering Services*;

(tt) *Other Contractors* means the contractors, consultants, or engineers retained by the *Owner*, to perform any work or services at, or related to, the *Owner's Site*, other than the *Contractor*;

(uu) *Owner* means PUC Distribution Inc.;

(vv) *Owner's Policies* means the policies of the *Owner* as attached in Appendix C – Owner's Policies;

(ww) *Owner's Representative* means that person identified as such in Section 48.1 which may include a consultant hired by the *Owner*, if so designated, or that person's designated replacement;

(xx) *Owner's Requirements* means the description of the scope, standards, design criteria, *Performance Requirements*, *Milestones* and the programme of work set out in Appendix A – SSG Scope of Work to be further developed by the *Parties* during the course of the *Upfront Engineering Services*, as amended by any *Changes*;

(yy) *Owner's Site* means any portion of the *Work Site* which may have on it existing facilities, activities or operations of the *Owner* or its *Affiliates*;

(zz) *Owner's Specified Materials and Subcontractors* means those materials, goods, products, processes, equipment and subcontractors specified in the *Owner Requirements* to be used in, or to be incorporated into, the *Work* by the *Contractor*, including any of the foregoing supplied by the *Owner*;

(aaa) *Performance Guarantees* mean those *Performance Requirements* upon which *Liquidated Damages for Performance* will be assessed if not met;

(bbb) *Performance Requirements* mean the performance requirements set out in the *Owner's Requirements*;

(ccc) *Performance Tests* mean the performance tests set out in the *Owner's Requirements* for the purpose of determining achievement of the *Performance Requirements* for the *Work*, and such other tests as may be agreed between the *Owner* and *Contractor* in order to compare actual performance of the *Work* with the *Performance Requirements*;

(ddd) *Pre-existing Hazardous Material* is any *Hazardous Material* present at the *Owner's Site* or a *Work Site* that was not brought onto such site by *Contractor*;

(eee) *Previous Claims* has the meaning given to it in Section 42.1;

(fff) *Project* means the Sault Smart Grid Project;

(ggg) *Proprietary Information* means all inventions, discoveries, improvements and technical information not in the public domain, which the *Contractor*, *Subcontractors*, or their respective employees or agents who are performing the *Work*, may conceive of, reduce to practice or develop during the *Contract Time*, as a result of the *Owner's Requirements* or *Confidential Information*;

(hhh) *Records* means the books, statements, records and accounts pertaining to the *Contract* and the performance of the *Work*, whether in paper or electronic form;

(iii) *Review Procedure* means the procedure described as such and set out in the *Owner's Requirements*;

(jjj) *Safety Plan* means the plan, as specified in the *Owner's Requirements*, which includes, but is not limited to, safety performance requirements, mitigation plans, training and orientation requirements, site safety and access rules, reporting and safety meeting frequency, site cleanliness requirements and other occupation health and safety requirements and compliance issues;

(kkk) *Scheduled Completion Date for Upfront Engineering* means the date on which the *Upfront Engineering Services* are scheduled to be completed, which is the date that falls nine (9) months after the issuance of the *Notice to Proceed with Upfront Engineering*;

(lll) *Scheduled Final Completion Date* means the date on which the *Work* is scheduled to achieve *Final Completion*, which will be set out in the *Notice to Proceed with Balance of Work*;

(mmm) *Subcontractors* means any subcontractors, consultants, suppliers or vendors hired by the *Contractor* to perform any portion of the *Work* or supply any *Goods*;

(nnn) *Substantial Completion* means that date when the *Work*:

(i) has passed the required *Performance Tests* that are stipulated in the *Owner's Requirements* to be performed before *Substantial Completion*;

(ii) is certified by the *Owner's Representative* pursuant to Section 20.5 as being complete or ready to be put into service, or being used for the purpose intended and a *Substantial Completion Certificate* is issued; and

(iii) has achieved substantial performance of the work, as defined in the Construction Act (Ontario);

(ooo) *Substantial Completion Certificate* means that notice, in the form attached hereto as Appendix F – Forms, issued by the *Owner* to the *Contractor* pursuant to Section 20.5, certifying achievement of *Substantial Completion* and identifying the date that the *Owner* takes over the *Work*;

(ppp) *Suspended Work* means any *Work*, or portion thereof, which the *Owner* has suspended pursuant to Article 34 - Suspension;

(qqq) *System* means any component system of the *Work*, or any part thereof as the context requires;

(rrr) *Test Plan* means the plan for testing, which shall be prepared by either the *Owner* or the *Contractor* as specified in the *Owner's Requirements*;

(sss) *Upfront Engineering Fixed Price* has the meaning given to it in Appendix B – Compensation;

(ttt) *Upfront Engineering Services* mean those *Engineering Services* which are described under the section titled "Step 1 Engineering" in Appendix A – SSG Scope of Work

as well as the applicable project management activities which are described under the section titled "Project Management" in Appendix A – SSG Scope of Work and all other work and services required by this *Contract* to be performed as part of the *Upfront Engineering Services*, and which shall be sufficient for the parties to agree on the *Notice to Proceed with Balance of Work*, in accordance with the process described in Appendix B – Compensation;

(uuu) *Warranty Item* means any *Deficiency* that is identified after a *Functional Completion Certificate* or the *Substantial Completion Certificate* is issued or is incorporated into a *Functional Completion Certificate* or the *Substantial Completion Certificate* to be remedied after *Functional Completion* or *Substantial Completion*;

(vvv) *Warranty Period* commences on the date of *Functional Completion* or *Substantial Completion*, as applicable, and continues for 1 year from the date of *Substantial Completion* as stated in the *Substantial Completion Certificate*;

(www) *Work* means all *Engineering Services*, project management, *Goods*, *Construction Work* and those duties allocated to the *Contractor* in the *Commissioning before Functional or Substantial Completion* and *Commissioning after Functional or Substantial Completion*, as may be necessary to fulfill the *Owner's Requirements* and includes anything that is ancillary or necessary by implication to fulfill the *Owner's Requirements*;

(xxx) *Work Day* means any day, except for a Saturday, Sunday, a general holiday or a holiday which is observed in the construction industry in Ontario, or defined as a holiday in a collective agreement entered into by the *Owner* pertaining to the *Work Site*; and

(yyy) *Work Site* means those lands where the *Project* is located and which are legally and municipally described as such in the *Owner's Requirements*.

1.2 The following schedules attached hereto shall form part of and are incorporated in this *Contract*:

(a) Appendix A – SSG Scope of Work
(b) Appendix B – Compensation
(c) Appendix C – Owner's Policies
(d) Appendix D – Warranty Items Procedure
(e) Appendix E – Parent Guaranty
(f) Appendix F – Forms
  - Key Employee Confidentiality, Proprietary Information and Consent Agreement
  - Statutory Declaration

(g) Appendix G – Dispute Resolution Procedure
(h) Appendix H – Key Personnel

Article 2 - Interpretation and Order of Precedence

2.1 Unless the context otherwise requires, words importing the singular shall include the plural and vice-versa and words importing gender shall include the masculine, feminine and neuter genders.

2.2 The headings and sub-headings of the *Contract* are used for convenience and ease of reference only and in no way define, limit, describe or interpret the scope or intent of the *Contract*.

2.3 If there is a conflict in the *Contract*, the order of precedence of documents, from highest to lowest, shall be:

(a) this *Contract*, excluding the *Appendices*;

(b) *Change Orders* and *Change Directives*;

(c) Appendix A – SSG Scope of Work;

(d) Appendix B – Compensation;

(e) Appendix C – Owner's Policies; and

(f) all other *Appendices*.

2.4 The following shall, in all instances, apply:

(a) for documents revised by either party and approved by the *Owner*, the latest revision shall govern;

(b) figured dimensions on drawings shall govern, even though they may differ from scaled dimensions;

(c) drawings of larger scale shall govern over those of smaller scale of the same date; and

(d) specifications shall govern over drawings regardless of time.

2.5 Wherever this *Contract* requires an action to be performed or an obligation to be undertaken, such action or obligation shall be performed in a reasonable manner by the party taking the action or fulfilling its obligation unless its explicitly stated to be in the discretion of the party performing the action or having undertaken the obligation.

Article 3 - Owner's Requirements

3.1 The *Owner's Requirements* shall describe the scope of the *Work*. As part of the *Upfront Engineering Services*, the *Contractor* will further develop the *Owner's Requirements* based

on the parameters set forth in Appendix A – SSG Scope of Work and input received from the *Owner*.

3.2 The *Owner's Requirements* shall specify the requirements of the *Safety Plan*, which shall be developed and implemented by the *Contractor*.

3.3 The *Owner's Requirements* shall specify the *Owner's Site* access requirements, which will be developed by the *Owner* and implemented by the parties.

3.4 Subject to Section 14.9, all conflicts with respect to the interpretation of the *Owner's Requirements* shall be resolved by the *Owner's Representative*.

Article 4 - Notice to Proceed with Balance of Work

4.1 The *Upfront Engineering Services* shall include all services required to facilitate parties' agreement on the *Notice to Proceed with Balance of Work* by the *Scheduled Completion Date for Upfront Engineering.* The *Notice to Proceed with Balance of Work* shall record the parties' agreement on the following matters, among others:

(a) *Owner's Requirements*;

(b) *Fixed Price*;

(c) any *Milestones* and corresponding *Milestone Dates*;

(d) *Contractor's* acceptance of site conditions as described under Section 5.5 and Section 5.6;

(e) *Owner's Site* and *Work Site* access to be provided to *Contractor*.

Article 5 - General Requirements of the Work

5.1 The scope of the *Work* includes correction of *Deficiencies* by the *Contractor* in accordance with the *Contract*.

5.2 As part of the *Upfront Engineering Services*, the *Contractor* shall prepare and submit to the *Owner* a detailed *Execution Plan* for the performance of all or any part of the *Work* required under the *Contract*. The *Contractor* shall control the progress of the *Work* to achieve compliance with the *Execution Plan*.

5.3 In the execution of the *Work* the *Contractor* shall comply with, and the completed *Work* shall comply with, the *Law* and the standards specified in the *Contract*.

5.4 References in the *Contract* to applicable codes, standards or regulations shall be understood to be references to the edition applicable on the date of the *Contract*, unless stated otherwise. If substantially changed or new applicable codes, standards or regulations come into force after the date of the *Contract*, the *Contractor* shall submit a *Change Quotation* for compliance to those new codes, standards or regulations to the *Owner's Representative*. Any *Change* in the *Work*, the *Contract Time* or the *Compensation* as a result shall be dealt with under Article 14 - Changes.

5.5 The *Contractor* will accept the *Owner's Site*, the *Work Site* and the obligation to perform the *Work* in the condition existing at the time of the execution of the *Notice to Proceed with Balance of Work*, and at that time, the *Contractor* will acknowledge that it has investigated and satisfied itself as to:

(a) the nature of the *Work*; and

(b) the magnitude of the *Work.*

Additionally, the *Contractor* will investigate the following conditions as part of the *Upfront Engineering Services,* and the *Notice to Proceed with Balance of Work* will include the *Contractor's* acceptance of the following conditions, which may be subject to commercially reasonable qualifications:

(c) the location of and all conditions relating to the *Owner's Site* and the *Work Site*, including, but not limited to, accessibility, general character, surface conditions, utilities, roads, uncertainties of seasonal weather and all other physical, topographical and geographical conditions, but excluding subsurface or other concealed conditions unless disclosed by the *Owner* or described in the *Owner's Requirements*; and

(d) all environmental risks, conditions, *Law* and restrictions applicable to the *Contractor* or the *Work* or that may affect the *Work.*

5.6 Additionally at the time of the execution of the *Notice to Proceed with Balance of Work*, the *Contractor* will accept the obligation to perform the *Balance of the Work* and acknowledge that it has investigated and accepts:

(a) the general character, quality, quantity and availability of equipment and materials required to execute and complete the *Work*; and

(b) all conditions affecting labour, including, availability, productivity and administrative practices, including those relating to safety, prevailing at or applicable to the *Work.*

5.7 The *Owner* reserves the right to award separate contracts to *Other Contractors* for work to be performed at or adjacent to the *Work Site* and to perform work with its own forces at or adjacent to the *Work Site*. In such event, the *Contractor* shall co-ordinate and schedule the *Work* with the work of the *Other Contractors* and the *Owner's* own forces, and the *Contractor* shall share access to and use of the *Work Site* to accommodate the work of *Other Contractors* and the *Owner's* own forces. If work performed by *Other Contractors* as directed by the *Owner* interferes with the *Work* performed by the *Contractor*, the *Contractor* may issue a *Change Quotation* in accordance with Section 14.9.

5.8 The *Contractor* shall co-operate fully with the *Owner*, *Other Contractors* and all other parties with whom the *Contractor* or *Owner* may be involved during the performance of the *Work.* The *Contractor* shall supervise its employees and *Subcontractors* and inspect their work to ensure that the *Work* conforms in each and every respect to the *Owner's Requirements* and in accordance with Section 11.1.

5.9 Approval of the *Engineering Services*, acceptance of any part of the *Goods* or the *Construction Work* by the *Owner*, or payment to the *Contractor*, or any one or more of them, shall not relieve the *Contractor* from its responsibilities under the *Contract*.

5.10 The *Contractor* shall provide the *Owner* with written reports detailing the status of the *Work* and all issues relating to the *Work*, in the form specified by the *Owner's Requirements* or as otherwise agreed to by the *Contractor* and the *Owner*, and shall attend meetings as required by the *Contract*, or as otherwise requested by the *Owner's Representative*.

5.11 The *Contractor* shall have those responsibilities for managing the *Work* as stipulated in the *Owner's Requirements*, including:

(a) cost monitoring, scheduling and reporting to the *Owner*;

(b) scheduling the *Work* and monitoring and reporting on the progress of the *Work* relative to the *Milestones* to the *Owner*;

(c) coordination, scheduling and supervision of *Subcontractors*;

(d) coordination and management of transportation and related services for the *Work*;

(e) management of the *Work* to ensure the *Work* is performed in an efficient and coordinated manner; and

(f) preparation of reports and attendance at meetings with the *Owner*.

5.12 The *Contractor* shall ensure that no activities or actions are undertaken in the performance of the *Work*, or otherwise by the *Contractor*, which would adversely affect, restrict or limit in any way the continued operation of the *Owner's* other facilities which are in operation, unless required to perform the *Work*, done in accordance with the *Execution Plan* and authorized in writing by the *Owner's Representative*.

5.13 In the performance of the *Work*, the *Contractor* shall give due consideration to the interest and property of others wherever involved, and shall carry out and perform the *Work* in a manner which shall cause the minimum of inconvenience, injury, and damage to others.

5.14 The *Owner* shall provide, during the course of the *Upfront Engineering Services*, documents relating to the *Owner's Site*, and the *Contractor* shall abide by all such documents provided by the *Owner*, including, but not limited to, any special restrictions and conditions contained in any easement, regulatory board order, crossing agreement, or other permit relating to the *Work Site*.

5.15 The *Contractor* shall, in accordance with good industry practice and the *Owner's Requirements*, protect the *Work*, the *Work Site*, the property of the *Owner*, *Other Contractors* and neighbouring owners from damage during the prosecution of the *Work*, including providing off-hours *Work Site* security if required by the *Owner's Requirements*. The *Contractor* shall restore, at its expense, all *Work* and property at the *Work Site* damaged in the performance of the *Work* including, without limitation, any buildings, fences, hedges, roads, railroads, bridges, culverts, drainage ditches, irrigation ditches and

levees that may be located in the *Work Site* area. The *Contractor* shall also restore, at its expense all property of the *Owner*, *Other Contractors* and neighbouring owners damaged due to *Contractor's* negligence or failure to protect such property as required under the *Contract*.

5.16 Each of the parties shall promptly and fully inform each other of any errors, omissions or inconsistencies in the *Contract*, defects or *Deficiencies* in the *Work* and of any inconsistencies between the *Contract* and the *Law*, of which they become aware. The *Contractor* shall exercise reasonable care and diligence to prevent any actions or conditions which could result in any such inconsistencies, defect or *Deficiencies*. If the *Contractor* discovers any inconsistencies in the *Contract*, or between the *Contract* and the *Law*, or discovers any defects or *Deficiencies* in the *Work*, it shall resolve all such inconsistencies with the *Owner* before proceeding with the affected portion of the *Work*. If the *Contractor* discovers any inconsistencies in the *Contract*, or between the *Contract* and the *Law*, or discovers any defects or *Deficiencies* in the *Work*, and proceeds without resolution with the *Owner*, the *Contractor* shall proceed at the *Contractor's* own risk and expense and waives all rights to claim against the *Owner* for the same.

5.17 All documents and drawings prepared as part of the *Work* shall be in English.

5.18 The *Owner* shall have the right but not the obligation to use, at any time, and from time to time, any and all portions of the *Work* that have reached a stage of completion as to permit such occupancy, provided such occupancy does not unreasonably interfere with the operations of the *Contractor* hereunder or prevent an expeditious completion of the *Contract* by the *Contractor* hereunder. The *Contractor* agrees to permit such use and to use all reasonable efforts to facilitate the *Owner* in the occupancy of such available and useful portions of the *Work*.

Article 6 - Engineering Services

6.1 The *Contractor* shall perform the *Engineering Services* and be responsible for the design and engineering necessary to execute the *Work*. The *Engineering Services* shall be prepared under the supervision of the *Contractor's* qualified professional engineers licensed by Professional Engineers Ontario. All final plans, specifications, reports or documents of a professional nature shall be signed by and stamped or sealed with the stamp or seal of:

(a) the professional member or licensee who prepared them or under whose supervision and control they were prepared; or

(b) the professional member or licensee who thoroughly reviewed and accepted professional responsibility for them.

6.2 The professional members and licensees referred to in Section 6.1 shall be available to meet with the *Owner's Representative* at all reasonable times during the *Contract Time* and *Warranty Period*.

6.3 The *Owner* shall have the right of inspection and review of the design drawings and specifications at all reasonable times. No inspection, or failure to inspect, by the *Owner* shall relieve the *Contractor* of the *Contractor's* obligations under the *Contract*.

6.4 Prior to commencement of the *Performance Tests*, the *Contractor* shall prepare, and submit to the *Owner's Representative*, operation and maintenance manuals in accordance with the *Owner's Requirements*. The *Work* shall not be considered to be completed for the purposes of achieving *Functional Completion* or *Substantial Completion* until such operation and maintenance manuals have been submitted to the *Owner's Representative*.

6.5 The *Contractor* shall:

(a) prepare, and keep up-to-date, the *As-Built Drawings;*

(b) record the exact locations of each of these differences, sizes and details of the *Construction Work* as executed, with cross-references to relevant specifications and other requirements on the *As-Built Drawings*;

(c) keep the *As-Built Drawings* on the *Work Site*;

(d) during the *Contract Time*, provide the *Owner* with access to the *As-Built Drawings*; and

(e) upon completion of the *Work*, or at such other time as may be determined by the *Owner*, submit the *As-Built Drawings* and copies to the *Owner's Representative* in accordance with the *Owner's Requirements*.

6.6 The *Contractor* shall submit to the *Owner's Representative* the *Engineering Submissions* in accordance with the *Review Procedure* set out in the *Owner's Requirements* and in accordance with the *Execution Plan*.

6.7 No inspection, evaluation, review, approval, acceptance, consent, design reviews, commentaries, audits, objections or monitoring by the *Owner* in connection with the *Engineering Submissions* or any of the *Work* shall under any circumstances relieve or excuse the *Contractor* from any of its obligations to ensure its complete compliance with this *Contract*.

Article 7 - Owner's Specified Materials and Subcontractors

7.1 The parties agree that *Owner* is permitted to require *Contractor* to utilized *Owner's Specified Materials and Subcontractors* as those may be set out in the *Owner's Requirements* or a *Change Order* signed by both parties. After the issuance of the *Notice to Proceed with Balance of Work*, *Owner* retains the ability to direct *Contractor* to use *Owner's Specified Materials and Subcontractors* by way of a *Change Directive* but only in respect of materials, goods, products, processes and equipment, and not subcontractors. Where a *Change Directive* is issued directing the *Contractor* to use the *Owner's Specified Materials and Subcontractors*, the *Contractor* shall, within 5 *Work Days* of receipt of the *Change Directive*, or such longer period as the *Contractor* may reasonably require as agreed to by the *Owner*, review the *Owner's Specified Materials and Subcontractors* to

determine whether such materials are acceptable to perform the *Engineering Services* and *Construction Work* and can be made available for procurement without interfering with the achievement of the *Milestones* by the *Milestone Date* and issue a written notice of its determination to the *Owner*.

7.2 If the *Owner's Requirements* or a *Change Order* require the *Contractor* to use *Owner's Specified Materials and Subcontractors*, or if *a Change Directive* requires *Contractor* to use *Owner's Specified Materials and Subcontractors* and the *Contractor* either determines that the *Owner's Specified Materials and Subcontractors* are acceptable for the *Work* or fails to issue a written notice of its determination to the *Owner* within the time period specified above, then the *Owner's Specified Materials and Subcontractors* shall be used and incorporated in the *Work* in the same manner as those materials and pieces of equipment proposed by the *Contractor* and the *Contractor* shall take responsibility for the *Owner's Specified Materials and Subcontractors* and all warranty provisions that apply thereto.

7.3 If a *Change Directive* requires *Contractor* to use *Owner's Specified Materials and Subcontractors* and the *Contractor* determines that the *Owner's Specified Materials and Subcontractors* are not acceptable for the *Work*, then the *Contractor* shall give notice to the *Owner* that the *Owner's Specified Materials and Subcontractors* are not suitable for the *Work*, which notice will provide details of the reasons why the *Owner's Specified Materials and Subcontractors* are not acceptable for use or incorporation into the *Work*.

7.4 Where the *Contractor* has provided notice to the *Owner* that the *Owner's Specified Materials and Subcontractors* are not acceptable for the *Work*, the *Owner* shall promptly notify the *Contractor* of the *Owner's* decision as to whether or not to include the *Owner's Specified Materials and Subcontractors* in the *Work*.

7.5 If the *Owner* chooses to direct the *Contractor* to use the *Owner's Specified Materials and Subcontractors* by way of a *Change Directive* after the *Contractor* has notified the *Owner* that the *Owner's Specified Materials and Subcontractors* are not acceptable for the *Work*, then the *Owner* shall take full responsibility for the *Owner's Specified Materials and Subcontractors*, including any warranty claims and damages that may occur from the use or incorporation of the *Owner's Specified Materials and Subcontractors*.

Article 8 - Procurement of Goods

8.1 Unless specified in the *Owner's Requirements*, the *Contractor* shall procure *Goods* for its own account, not as agent for the *Owner*.

8.2 Where specified in the *Owner's Requirements*, the *Contractor* shall procure *Goods* using such selected vendor lists and *Owner's Specified Materials and Subcontractors* as directed by the *Owner*.

8.3 In accordance with the *Owner's Requirements*, the *Contractor* shall submit any required samples for the *Owner's Representative's* approval, together with any relevant information. The *Contractor* shall also submit for the *Owner's Representative's* approval, manufacturer's standard samples of materials (with relevant information) and any additional samples instructed by the *Owner's Representative*. All samples shall be labelled

as to origin and intended use in the *Work*. For each part of the *Work*, construction shall not commence prior to receipt of such approval to the relevant samples.

Article 9 - Construction Work

9.1 The *Contractor* shall perform the *Construction Work* in accordance with the *Contract*.

9.2 Except for those materials, services and equipment to be provided by the *Owner* and described in the *Owner's Requirements*, the *Contractor* shall supply or cause to be supplied all services, equipment and materials required for the proper execution and completion of the *Construction Work*.

9.3 Subject to Section 25.5, the *Contractor* shall take full responsibility for the adequacy, stability and safety of the *Work* and the *Work Site* operations under its control, of all methods of construction and of all of the *Construction Work*, unless the *Contractor* has received written instructions from the *Owner's Representative* absolving the *Contractor* of responsibility.

Article 10 - Commissioning

10.1 The duties of the *Owner* and of the *Contractor* in relation to *Commissioning before Functional* or *Substantial Completion* and *Commissioning after Functional* or *Substantial Completion*, together with the *Milestones* to be reached for commissioning, will be set out in the *Owner's Requirements*.

Article 11 - Contractor's Representations

11.1 The *Contractor* shall:

(a) perform the *Work* in a professional, efficient and workmanlike manner, using only qualified, skilful and careful workers, in strict accordance with the *Contract* and in accordance with sound and currently accepted design, engineering, procurement, construction and commissioning practices normally employed in utility construction similar to the *Work*;

(b) perform the *Work* in a safe and environmentally sound manner in compliance with the *Law*;

(c) ensure that the title to any and all *Goods* shall, upon delivery to the *Work Site*, be free from any and all claims, liens, charges, encumbrances or security interests of any kind whatsoever;

(d) ensure equipment and materials furnished, manufactured or fabricated by the *Contractor*, or its *Subcontractors*, for incorporation into the *Work*, shall:

(i) be free from all defects or *Deficiencies*;

(ii) meet the specifications in the *Contract*; and

(iii) shall be fit for the purpose for which the equipment and materials have been manufactured or fabricated and, if applicable, for its intended purpose as specified in the *Owner's Requirements*;

(e) perform the *Work* to meet the *Owner's Requirements*;

(f) comply with the *Contract*, including, but not limited to, all time schedules set out in, or called for by, the *Contract* or the *Execution Plan*; and

(g) ensure the *Work* shall be fit for its intended purpose as specified in the *Owner's Requirements*.

11.2 The *Contractor* represents and warrants to the *Owner* that:

(a) it has the experience, resources, personnel and capability to perform the *Work*;

(b) it is duly incorporated and validly existing under the laws of the jurisdiction(s) of its incorporation and is registered to carry on business in the Province of Ontario;

(c) it has all required permits, licenses and authorizations necessary to carry on its business; and

(d) the *Contractor* has the right to use, employ and incorporate in the *Work* those things or ideas to which the *Contractor* gives the *Owner* a license under Section 28.4.

Article 12 - Contract Time

12.1 The *Contractor* shall:

(a) commence the *Upfront Engineering Services* on receipt of the *Notice to Proceed with Upfront Engineering*;

(b) complete the *Upfront Engineering Services* by the *Scheduled Completion Date for Upfront Engineering*;

(c) commence the *Balance of Work*, in accordance with the *Notice to Proceed with Balance of Work*;

(d) achieve *Final Completion* of all of the *Work* by the *Scheduled Final Completion Date*.

12.2 The *Contractor* shall, unless otherwise provided for in this *Contract* or altered by any *Change Order* or a *Change Directive*, achieve the *Milestones* by the *Milestone Dates* and perform the *Work* in accordance with the *Execution Plan*.

12.3 If a party fails to meet its obligations set out in this *Contract* in a timely manner, the other party may raise the failure of a timely action as provided for in Appendix G – Dispute Resolution Procedure; however, in such case the parties shall continue to perform the *Work* and their respective obligations under this *Contract* while the matter is being resolved.

12.4 The *Contractor* shall be entitled to receive a *Change Order* for a change in the *Contract Time*, including the *Scheduled Final Completion Date*, and an adjustment to the *Upfront Engineering Fixed Price* if the *Notice to Proceed with Upfront Engineering* is issued later than December 31, 2020. The *Upfront Engineering Fixed Price* will be adjusted by multiplying it by the Consumer Price Index, as published by Statistics Canada in Table: 18-10-0004-01 ("**CPI Index**"), for the month in which the *Notice to Proceed with Upfront Engineering* is issued and dividing it by the CPI Index for November 2020.

12.5 It shall be a condition precedent of the issuance of the *Notice to Proceed with Upfront Engineering* that the *Owner's* ICM (Incremental Capital Module) application has concluded successfully in respect of rates and revenue recovery, as determined by the *Owner* in its sole discretion. The *Owner* will attest to the satisfaction of this condition precedent in the *Notice to Proceed with Upfront Engineering*, and the *Contract* may rely on such attestation without further inquiry.

Article 13 - Payment

13.1 As full and complete compensation for the *Work*, the *Owner* shall pay the *Contractor* the *Compensation* pursuant to the terms of Appendix B – Compensation which shall in no event exceed the *Compensation* payable in accordance with the *Contract*.

13.2 The *Contractor* shall prepare and submit invoices for all *Work* performed in accordance with Appendix B – Compensation.

13.3 Should either party fail to make payments as they become due under the terms of the *Contract* or in an award of arbitration or judgment of a court, interest at the rate of 4% per annum compounded semi-annually on any unpaid amounts shall also become due and be payable.

Article 14 - Changes

14.1 The *Owner* shall have the right, at any time, to make a *Change*.

14.2 When a *Change* is proposed by the *Owner*, then the *Owner* shall provide a *Contemplated Change Notice* to the *Contractor* describing the proposed *Change*.

14.3 The *Contractor*, upon receipt of a *Contemplated Change Notice*, shall within 10 *Work Days*, or such longer period as the *Contractor* may reasonably require as agreed to by the *Owner*, provide the *Owner's Representative* with a *Change Quotation* which shall include a method of adjustment or an amount of adjustment to the *Compensation*, if any, and any adjustment in the *Contract Time* for the proposed *Change*.

14.4 Following receipt of a *Change Quotation*, the *Owner* shall within 10 *Work Days* either agree to the adjustments in the *Contract Time* and the *Compensation* or to the method to be used to determine the adjustments, or give the *Contractor* notice that the *Change Quotation* is not acceptable.

14.5 If the *Change Quotation* is agreed to, then the *Owner* shall issue a *Change Order* recording the *Change*, which shall be signed by the *Owner* and the *Contractor*. The value of the *Work*

performed as a result of a *Change Order* shall be included in invoices for payment given by the *Contractor* in accordance with the terms of payment in Appendix B – Compensation and shall identify those portions of the invoice charged for the *Change Order*. A *Change Order* shall constitute a final settlement of all matters relating to the *Change* in the *Work* which is the subject of the *Change Order*, including but not limited to all direct and indirect costs associated with such *Change* and any and all adjustments to the *Compensation*, the *Milestones* and *Milestone Dates* and the *Execution Plan*.

14.6 If the *Owner* requests the *Contractor* to provide a *Change Quotation* and subsequently elects not to proceed with the *Change*, the *Contractor* shall be reimbursed in accordance with Appendix B – Compensation, or as otherwise agreed between the parties, for its reasonable costs incurred including design and engineering services, and the *Owner* shall issue a *Change Order* for these costs.

14.7 If the *Owner* requires the *Contractor* to proceed with the *Change* before the *Owner* and the *Contractor* agree, or, if the *Owner* and the *Contractor* have failed to agree upon the adjustment in *Contract Time* and the *Compensation*, then the *Owner* shall issue a *Change Directive* directing the *Contractor* to proceed with the *Work*.

14.8 Upon receipt of a *Change Directive*, the *Contractor* shall proceed promptly with the *Change* and:

(a) keep daily records of the time, materials and equipment employed in the *Change*, as well as original receipted bills covering costs of materials, including freight and haulage charges, and a copy of payroll records and shall submit such records to the *Owner's Representative* on a weekly basis;

(b) the *Compensation* shall be adjusted in accordance with the rates set forth in Appendix B – Compensation or, where no such rates are provided, the parties will use a transparent, open-book process to negotiate the adjustment to the *Compensation*, which shall, to the extent applicable, be based on the price breakdown provided in the *Cost Estimate for Balance of Work* on which the *Fixed Price* was based, or shall be settled in accordance with Appendix G – Dispute Resolution Procedure; and

(c) the *Contract Time* shall be adjusted by agreement between the parties, or shall be settled in accordance with Appendix G – Dispute Resolution Procedure.

14.9 If, during the performance of the *Work*, the *Contractor* is of the opinion that any instruction, interpretation, decision or direction from the *Owner* should have, but has not, resulted in a *Contemplated Change Notice* or *Change Directive* being issued, the *Contractor* shall give the *Owner* 10 *Work Days* notice with a *Change Quotation* requesting an adjustment in *Contract Time* and the *Compensation* required. If the *Contractor* does not issue a *Change Quotation* within the specified time, then the *Contractor* shall have no claim for any claim against the *Owner* attributable to that instruction, interpretation, decision or direction.

14.10 If the *Owner* receives a *Change Quotation* from the *Contractor* pursuant to Section 14.9, the *Owner* shall promptly consider the *Change Quotation* and immediately issue a *Change Order*, *Change Directive* or advise the *Contractor* in writing that the *Contractor's* request is denied. If the *Contractor* disputes the *Owner's* decision, the *Contractor* shall, before

proceeding with the *Work*, provide notice to the *Owner* disputing the *Owner's* decision, but in all cases, the *Contractor* shall proceed with the *Work*. In such event, the *Contractor* shall keep daily records in accordance with Section 14.8(a), in respect of the disputed work. The *Contractor's* entitlement to an adjustment in the *Contract Time* and the *Compensation* shall then be resolved in accordance with Appendix G – Dispute Resolution Procedure.

14.11 No modification, addition, deletion or other revision to the *Owner's Requirements* shall be binding on either party unless set out in a *Change Order*, required by a *Change Directive* or determined by Appendix G – Dispute Resolution Procedure. Neither the keeping of daily records in respect of disputed work nor the signing of those records by the *Owner's Representative* shall be considered an admission of entitlement to payment by the *Owner*. Such records, if signed by the *Owner,* shall only constitute the *Owner's* agreement that the time, materials and equipment were spent or employed in respect of the *Work* for which a *Change Directive* has been issued, or in respect of the *Work* in relation to which the *Contractor* has given notice of a dispute pursuant to Section 14.9.

14.12 The *Contractor* shall include in its *Change Quotation* all costs and changes in *Contract Time* reasonably expected to result from a *Change* including any impact costs or costs of acceleration.

14.13 If the *Contractor* encounters actual subsurface or other concealed physical conditions at the *Work Site* which are materially different from any representations of existing conditions made in the *Owner's Requirements*, then the *Contractor* shall provide notice to the *Owner* within 10 *Work Days* of encountering the conditions and shall allow the *Owner* the opportunity for inspection before the conditions are further disturbed. If the *Contractor* fails to provide such notice to the *Owner* within 45 days, then the *Contractor* shall have no claim for any additional costs or delays attributable to such subsurface or concealed physical conditions.

14.14 The *Owner* shall promptly investigate the conditions described by the *Contractor* pursuant to Section 14.13 and if the actual conditions encountered by the *Contractor* at the *Work Site* differ materially from the conditions represented in the *Owner's Requirements* so as to substantially increase the cost to the *Contractor* or impact the *Contract Time*, then the *Owner* shall issue a *Change Order* to cover the increased cost and *Contract Time*.

Article 15 - Personnel

15.1 All communications between the *Owner* and the *Contractor* and all documents of whatever kind submitted to the *Owner* by the *Contractor* and its *Subcontractors* shall be in the English language. All of the *Contractor's* and the *Subcontractors'* personnel that deal with or communicate with the *Owner* shall be fluent in the English language. All training and supervision of the *Owner's* operating personnel shall be in the English language.

15.2 The *Contractor* shall employ, or cause to be employed, only supervisory personnel who are appropriately qualified, trained and experienced in safety, efficiency and quality of work supervision, and if requested by the *Owner*, accredited or enrolled in a program for accreditation, in the manner specified by the *Owner* in the *Owner's Requirements*.

15.3 At the *Owner's* request, the *Contractor* shall reassign, replace or remove personnel who, in the *Owner's* opinion, acting in good faith, negatively affect the efficiency, safety or *Scheduled Substantial Completion Date* of the *Work* or who have committed a violation of the *Owner's Policies*.

15.4 The *Contractor* shall not employ, or continue to employ, non-Canadian workers in Canada, except in compliance with the Immigration Act (Canada) and regulations, as amended from time to time. The *Contractor* shall obtain and produce to the *Owner's Representative* valid and subsisting employment authorizations with respect to all non-Canadian workers to be used to perform the *Work*.

15.5 The *Contractor* shall not, at any time during the *Contract Time* and for 24 months thereafter solicit or recruit any of the *Owner's* employees who have been involved in the *Project* for any of the *Contractor's* purposes or those of any of its affiliates.

Article 16 - Key Personnel

16.1 If not agreed to before the execution of the *Contract*, the *Contractor* shall submit a proposed organisational chart for the *Owner's* approval, as part of the *Execution Plan*. The organisational chart shall show the *Key Personnel* and other supervisory and staff personnel who shall be executing the *Work*, together with their respective job titles.

16.2 The *Owner* shall identify any of the *Key Personnel* to which the *Owner* objects within 10 *Work Days* and if the *Owner* does not provide the *Contractor* with its objections to the *Key Personnel*, the *Owner* shall be deemed to have accepted the *Key Personnel*.

16.3 If the *Owner* objects to any of the *Key Personnel* in accordance with Section 16.2, then the *Contractor* will promptly prepare a new organisational chart identifying the *Key Personnel* for the *Owner's* approval. This process shall be repeated until the *Owner* approves the *Key Personnel*.

16.4 Once the *Owner* has approved the organizational chart identifying the *Key Personnel*, the *Contractor* shall within 10 *Work Days* arrange for each of the *Key Personnel* to complete and execute an agreement in the form of the Key Employee Confidentiality Proprietary Information and Consent Agreement, attached as part of Appendix F – Forms.

16.5 Subject to Section 16.6, the *Contractor* shall not, without the *Owner's* consent, make any changes to the *Key Personnel* or an organisational chart that has been approved by the *Owner*.

16.6 If any *Key Personnel* leave the *Contractor's* workforce, the *Contractor* shall forthwith replace such *Key Personnel* with personnel possessing those qualifications necessary for the proper performance of the functions to which assigned. Where the *Compensation* for *Work*, or part thereof, is based on a reimbursable basis, then the *Owner* shall have the right to determine if the replacement personnel is suitable to the *Owner*, and if not suitable, the *Contractor* shall provide further replacement personnel until the *Owner* determines that the replacement person is suitable to the *Owner*.

Article 17 - Subcontracts, Assignment and Change of Control

17.1 The *Contractor* shall use those *Subcontractors* designated in the *Owner's Requirements* for the performance of the *Work* for which they are designated. For all other parts of the *Work*, the *Contractor* shall provide notice to the *Owner* of its intention to subcontract the performance of any *Work* or the supply of equipment and materials and of the intended *Subcontractor* before entering into any subcontract. The *Owner* may for reasonable cause, and acting in good faith, object to the use of a proposed *Subcontractor* and require the *Contractor* to obtain another *Subcontractor*. Any reviews or approvals by the *Owner* pursuant to the provisions of this Article or elsewhere in this *Contract* shall not release or relieve the *Contractor* of any of its obligations under this *Contract* or create any contractual relations between the *Owner* and any *Subcontractor*. The *Contractor* shall require any *Subcontractor* to agree to be bound by the pertinent portions of this *Contract*, which shall at a minimum include Article 14 - Changes, Article 24 - Safety and Loss Management and Appendix G – Dispute Resolution Procedure and any obligation to which the *Contractor* is specifically required to bind its *Subcontractors*. The *Contractor* shall ensure that each contract with a *Subcontractor* is assignable to the *Owner* without the need to obtain the consent of the *Subcontractor*.

17.2 Prior to the commencement of the *Balance of Work* the *Contractor* shall provide the *Owner's Representative* with a list of the names and addresses of all *Subcontractors* and others who the *Contractor* proposes to perform any part of the *Work*. The *Contractor* shall provide the *Owner's Representative* with any proposed changes to this list during the *Contract Time*.

17.3 Subject to Article 7 - Owner's Specified Materials and Subcontractors, the *Contractor* shall be fully responsible for any part of the *Work* performed by *Subcontractors* and for the acts or omissions of *Subcontractors* and all persons either directly or indirectly employed by them, to the same extent as the *Contractor* is for its own acts or omissions. Without in any way limiting the *Contractor's* obligations pursuant to the provisions of this Article or elsewhere under this *Contract*, the *Contractor* shall secure compliance with and enforce, at its own expense, for the benefit of the *Owner*, each of the contracts concluded by the *Contractor* with *Subcontractors*. *Owner* agrees that, except with the consent of *Contractor* or in an emergency situation, it will not issue any directions or instructions regarding the *Work* to a *Subcontractor* who is an *Affiliate* of the *Owner*.

17.4 The *Contractor* shall not assign the *Contract*, or any part thereof, without the prior approval of the *Owner*.

17.5 The *Owner* may assign this *Contract* including all rights and obligations hereunder, at any time without the prior agreement of the *Contractor*, provided that the *Owner* shall remain liable for the *Owner's* obligations under this *Contract*, unless the *Contractor* provides its consent to release the *Owner*, which consent shall not be unreasonably withheld.

17.6 The *Contractor* shall enforce the warranty obligations of its *Subcontractors*, and upon the request of the *Owner*, shall assign any warranty to the *Owner*. All contracts between the *Contractor* and its *Subcontractors* shall provide that warranties given by the *Subcontractor* shall be given to both the *Contractor* and the *Owner* and the warranties may be enforced by either the *Contractor* or the *Owner*.

17.7 Notwithstanding Section 17.1, the *Owner* shall not have the right to object to the use of *Subcontractors* performing *Engineering Services* who are *Affiliates* of the *Contractor* and who are licensed to provide such services. The remaining provisions of this Article 17 - Subcontracts, Assignment and Change of Control shall apply equally to such *Subcontractors* as to other *Subcontractors*.

17.8 The *Contractor* shall request and use its commercially reasonable efforts to obtain for the benefit of the *Owner*, the warranties and guarantees that it is possible to secure from its *Subcontractors* at the direction of Owner and, as a minimum, shall obtain and provide to the *Owner* the warranties required by the *Contract*. The *Contractor* shall do all things and provide all assistance reasonably necessary to enable the *Owner* to enforce warranties and guarantees provided by its *Subcontractors*.

17.9 The *Contractor* shall not undergo any *Change of Control* without the consent of the *Owner*; provided that the *Owner's* consent shall not be required where the *Contractor* has given notice of the *Change of Control* within 10 *Work Days* of its occurrence, the entity acquiring control is a substantially similarly financially situated to the *Guarantor*, and the entity acquiring control has provided a guaranty in the substantially in the form of Appendix E – Parent Guaranty within 10 *Work Days* of the notice of the *Change of Control*. In the event that *Contractor* undergoes a *Change of Control* in contravention of this Section 17.9, *Owner* may give *Contractor* a notice of default under Section 36.3.

17.10 The *Contractor* shall provide notice of any change in ownership of shares or units of ownership of *Contractor* or any person with direct ownership of share or units in Contractor, or in the direct or indirect power to vote or transfer any of the shares or units of ownership of such person, within 5 *Work Days* of its occurrence, with details of the change in ownership, including the legal names of relevant persons and details of the ownership interest of relevant persons before and after the change in ownership.

17.11 Within 10 *Work Days* of receipt of the *Notice to Proceed with Upfront Engineering*, the *Contractor* will deliver to *Owner* a guaranty executed by the *Guarantor* in form set out in Appendix E – Parent Guaranty.

Article 18 - Inspection and Testing

18.1 The *Contractor* shall develop and provide to the *Owner*, for the *Owner's* review and approval, an *Inspection and Test Plan* in time to allow the *Owner* to perform the inspections contemplated by this Article 18 - Inspection and Testing. The *Contractor* shall follow the approved *Inspection and Test Plan*.

18.2 At all times during the progress of the *Work*, the *Owner* or its designate shall have the right to inspect or witness any part of the *Work*.

18.3 The *Contractor* shall inspect and be solely responsible for the inspection of all workmanship, materials and equipment furnished by itself or its *Subcontractors* in respect of the *Work*, to ensure conformity in each and every respect to the *Contract* and the *Law* and to ensure that good and proper construction practices are followed and that the *Work* is performed in a safe and environmentally sound manner.

18.4 If the *Law* requires testing of any part of the *Work*, the *Contractor* shall provide the *Owner* with sufficient advance notice of the arrangements for the test.

18.5 If the *Owner's Requirements* require any test to be witnessed by the *Owner*, the *Contractor* shall provide the *Owner's Representative* with sufficient advance notice of its readiness for the test and the *Owner* or its designate shall then promptly witness the test. If the *Owner* or its designate fails to witness the test when scheduled, any re-testing required by the *Owner* shall constitute a *Change*.

18.6 If any portion of the *Work* is closed or covered by the *Contractor* without the *Owner's* permission and before the *Owner* has been given the opportunity to witness a required test, then, if required by the *Owner*, that portion of the *Work* shall be opened or uncovered for testing and re-closed or recovered, all at the *Contractor's* expense and without increasing the *Contract Time*.

18.7 Any *Work* which must be tested shall not be considered ready for inspection by the *Owner* until the *Contractor* has satisfied itself and notified the *Owner's Representative*, that, in the *Contractor's* opinion, that portion of the *Work* can successfully pass the test.

18.8 Any inspection, testing or witnessing of any of the *Work* or tests by the *Owner*, or omission or failure on the part of the *Owner* to inspect or test any of the *Work* shall not be construed to be an acceptance of any such *Work*, or as relieving the *Contractor* of its responsibilities pursuant to the *Contract* or the *Law*.

18.9 The *Contractor* shall ensure that all tools, equipment, temporary facilities and other items used in accomplishing the *Work*, whether purchased, rented, manufactured or fabricated by, or under the direction of the *Contractor*, or otherwise provided by the *Contractor* or *Subcontractors*, are safe, environmentally sound and maintained in good condition, capable of performing their required functions. In the case of tools, meters and other devices which require calibration, the *Contractor* shall ensure that such calibration is performed on the frequency recommended by the manufacturer and in accordance with normal industry practice.

18.10 The *Owner* reserves the right to inspect all tools and equipment brought on to the *Work Site* at any time during the progress of the *Work*. The *Owner's Representative* may require the *Contractor* to supply a qualified, independent engineering evaluation or certification that any item in question is suitable for its intended purpose, or to reject any item and require replacement with a proper and suitable item which is satisfactory to the *Owner's Representative*. If any tool or item of equipment is deemed by the *Owner* to be unsafe, environmentally unsound or incapable of doing the work for which it is intended, then the *Contractor* shall repair or replace it with a safe, environmentally sound and suitable tool or item of equipment at the *Contractor's* expense.

18.11 The *Owner* may, at any time during the progress of the *Work*, conduct inspections or tests on any part thereof, to determine whether the *Work* is in accordance with the *Owner's Requirements*. Such tests shall be at the sole expense of the *Owner*, unless the result of a *Performance Test* determines that the *Work* is not in accordance with the *Owner's Requirements*, in which case the *Contractor* shall reimburse the *Owner* for such

Performance Test and redo or repair the *Work* ready for a new *Performance Test* to be performed by the *Owner*.

Article 19 - Performance Tests

19.1 If *Performance Tests* are specified in the *Owner's Requirements*, this Article shall apply.

19.2 *Performance Tests* may be stipulated in the *Owner's Requirements* to be performed before, after, or both before and after *Functional Completion* or *Substantial Completion* and shall be performed by that party specified in the *Owner's Requirements*.

19.3 Unless otherwise stipulated in the *Owner's Requirements* the *Contractor* shall carry out the *Performance Tests* in accordance with the *Test Plan*.

19.4 When the *Contractor* considers that the *Work*, or any *System*, will pass the *Performance Tests*, the *Contractor* shall notify the *Owner* that the *Contractor* may perform the *Performance Tests* on, or to, the *Work* or a *System*.

19.5 If the *Work* or a *System*, or part thereof, passes one or more *Performance Tests*, the *Owner* shall promptly give notice acknowledging the success of the same to the *Contractor*.

19.6 If the *Work* or a *System* or part thereof, fails to meet one or more *Performance Tests*, the *Owner* shall promptly provide a notice of such failure to the *Contractor* and the *Owner* may:

(a) reject such *Work* or *System*, or part thereof, which has failed to pass a *Performance Test*; or

(b) conditionally accept such *Work* or *System*, or part thereof, on conditions which shall be stated in the notice to the *Contractor*.

19.7 If the *Work* or a *System*, or part thereof, fails one or more of the *Performance Tests*, then the *Contractor* shall:

(a) reimburse the *Owner* for all the *Owner's* direct costs in performing such failed *Performance Tests*;;

(b) prepare a report to the *Owner*, for the *Owner's* approval, proposing the alterations the *Contractor* will make to the *Work* or *System*, or part thereof, to bring the *Work* or *System* to a condition which the *Contractor* considers will pass the *Performance Tests*;

(c) redo or repair the *Work* or *System*, or part thereof, and repair any damage to the *Work* or *System* caused by the same in failing to meet the *Performance Test*, to make such *Work* or *System*, or part thereof, ready for a repeat of the failed *Performance Tests*.

19.8 If the *Work* or a *System*, or part thereof, fails to pass one or more *Performance Tests* as a result of actions or omissions by the *Owner*, the *Owner* shall promptly issue a *Change Order* providing a *Change* in the *Contract Time* or the *Compensation*, or both, as the case may be, to the *Contractor* for such *Performance Tests* and the *Contractor* shall proceed

with its obligations relating to the *Performance Tests* as set out in the *Owner's Requirements*.

19.9 If any revenue is generated from any of the *Performance Tests*, such revenue shall be to the account of the *Owner*.

Article 20 - Functional and Substantial Completion

20.1 If the *Work* is divided into *Systems*, the *Contractor* shall be entitled to apply for a *Functional Completion Certificate* for each *System*.

20.2 The *Contractor* may apply by notice to the *Owner's Representative* for a *Functional Completion Certificate* when, in the *Contractor's* opinion, a *System* is complete and ready for taking over by the *Owner*. Such notice shall include the *Deficiencies* which are acknowledged by the *Contractor*.

20.3 The *Contractor* may apply by notice to the *Owner's Representative* for the *Substantial Completion Certificate* when, in the *Contractor's* opinion, the whole of the *Work* is complete and ready for taking over by the *Owner*. Such notice shall include the *Deficiencies* which are acknowledged by the *Contractor*.

20.4 After receipt of the *Contractor's* application for a *Functional Completion Certificate* or for the *Substantial Completion Certificate*, the *Owner's Representative* shall, within 5 *Work Days* after the receipt of the same:

(a) reject the application, giving reasons and specifying the *Work* required to be done by the *Contractor*, which reasons shall specify Category "A" *Deficiencies*, related to the *Work* or *System* for which the application is made, and which, if not remedied, will prevent the *Owner* from testing, commissioning or starting-up the *Facilities*, and the Category "B" *Deficiencies*, related to the *Work* or *System* for which the application is made, which will not prevent the *Owner* from testing, commissioning or starting-up the *Facilities*; or

(b) issue the *Functional Completion Certificate* or the *Substantial Completion Certificate* to the *Contractor*, stating the date on which the *Work* or a *System* was completed in accordance with the *Contract*, attaching a list of Category "B" *Deficiencies*, related to the *Work* or *System* for which the application is made, and which if not remedied will not prevent the *Owner* from testing, commissioning or starting-up the *Facilities*, and the *Contractor* shall cease to be liable for, and shall relinquish care, custody and control of, such *Work* or *System* from the date of the *Functional Completion Certificate* or the *Substantial Completion Certificate* and responsibility shall pass to the *Owner*.

20.5 If the *Owner* determines that the *Work* does not meet *Substantial Completion*, or a *System* does not meet *Functional Completion*, the *Owner* shall provide a notice to the *Contractor* as specified in Section 20.4(a) and the *Owner's Representative* may:

(a) order further repetition of *Performance Tests* specified to be performed before *Functional Completion* in the *Owner's Requirements*, or other tests necessary to determine *Functional Completion* or *Substantial Completion*; or

(b) issue a *Functional Completion Certificate* or the *Substantial Completion Certificate*, in which case, if the *Owner* so requires, the *Compensation* shall then be reduced by such amount as may be agreed by the *Owner* and the *Contractor* (in full satisfaction of such failure only), and the *Contractor* shall then proceed in accordance with the *Contractor's* other obligations under the *Contract*.

20.6 If the *Owner's Representative* fails either to issue a *Functional Completion Certificate* or the *Substantial Completion Certificate* or to reject the *Contractor's* application within the period of 14 days, the *Functional Completion Certificate* or *Substantial Completion Certificate* shall be deemed to have been issued on the date specified by the *Contractor* for *Functional Completion* or *Substantial Completion* in the notice in accordance with Section 20.2.

20.7 Where the *Contractor's* application for a *Functional Completion Certificate* or the *Substantial Completion Certificate* is rejected by the *Owner* in accordance with 20.4(a), the *Contractor* shall not re-apply for the *Functional Completion Certificate* or the *Substantial Completion Certificate* under Section 20.2 until the Category "A" *Deficiencies* are remedied.

20.8 If the *Contractor* is prevented from carrying out a *Performance Test* by a cause for which the *Owner* or one or more *Other Contractors* are responsible, the *Contractor* shall notify the *Owner* within 48 hours of such delay and if the *Contractor* is further prevented during the next 48 hours from doing so, the *Owner* shall issue a *Change Order* to compensate the *Contractor* for a *Change* in *Compensation* or *Contract Time*, as may be applicable.

20.9 After a *Functional Completion Certificate* or the *Substantial Completion Certificate* is issued, either for a *System* or the whole of the *Work*, the *Owner* may continue to identify *Deficiencies*. Where *Deficiencies* are identified after issuance of a *Functional Completion Certificate* or the *Substantial Completion Certificate*, the procedure for dealing with and resolving such *Deficiencies* shall be as set forth in Appendix D – Warranty Items Procedure.

Article 21 - Final Completion

21.1 It is a condition precedent to the issuance of a *Final Completion Notice* that the *Contractor* satisfy each of the following requirements:

(a) the *Work* has been fully completed in accordance with the terms and conditions of this *Contract*;

(b) all *Deficiencies* with respect to the *Work* have been remedied to meet the requirements of the *Contract*;

(c) all obligations of the *Contractor* to other parties in relation to the *Work*, for which the *Owner* could in any way be held responsible, have been fully satisfied; and

(d) the *Contractor* has delivered to the *Owner* the following:

(i) a statutory declaration in the form included in Appendix F – Forms and modified as required to include the following:

(a) the amount of final sums payable;

(b) the date the *Contractor* completed the *Work*, to evidence the expiration of the term for filing liens; and

(c) the full payment of all payrolls and other similar indebtedness, and all other sums and obligations whatsoever incurred by the *Contractor* in carrying out the *Work*, including, without limitation, payments to *Subcontractors* or for materials or equipment;

(ii) a declaration that the *Contractor* is not aware of any lien having been preserved (by registration or otherwise) or any written notice of lien having been delivered in relation to the *Work* or the *Contract* other than those of which the *Contractor* has given written notice to the *Owner* and which the *Contractor* has removed, vacated or effected the withdrawal of in accordance with its obligations under the *Contract*;

(iii) a clearance certificate from the WSIB (Ontario);

(iv) any *As-Built Drawings* and operations manuals for which the *Contractor* is responsible;

(v) assignments of any warranties provided by manufacturers or suppliers of materials;

(vi) written evidence of good standing from union representatives, if any; and

(vii) a Release and Certificate of Final Payment, in the form provided in Appendix F – Forms, releasing all of the *Contractor's* claims against the *Work* and the *Owner* arising under or by virtue of this *Contract*, other than such claims, if any, as may be expressly identified by their nature and amount by the *Contractor* in the Release and Certificate of Final Payment, or as attached as an attachment thereto.

21.2 When conditions precedent set out in Section 21.1 have been met by the *Contractor*, the *Owner* shall issue to the *Contractor* a *Final Completion Notice*.

Article 22 - Liquidated Damages

22.1 *Liquidated Damages* shall be paid by the *Contractor* to the *Owner* in accordance with the *Notice to Proceed with Balance of Work. Liquidated Damages* will be agreed to by the parties in accordance with the following parameters:

(a) The parties shall agree to *Liquidated Damages* as a genuine pre-estimate of the damages that the *Owner* will suffer due to the occurrence of the event triggering the payment of *Liquidated Damages*.

(b) *Liquidated Damages for Delay* shall protect the *Owner* from losses associated with failure to complete the *Work* by the *Scheduled Final Completion Date* and thus not within the timeframe required under its funding arrangement with National Resources Canada. [redacted]

(c) [redacted]

22.2 Subject to the *Contractor's* obligations pursuant to Section 32.1, any right of the *Owner* to claim injunctive relief and any express right of the *Owner* under this *Contract* to terminate this *Contract* or to perform any *Work* on the *Contractor's* behalf, *Liquidated Damages* shall be the *Owner's* sole remedy to claim from the *Contractor* for any damages due to failure to meet the *Scheduled Final Completion Date* or failure to meet *Performance Guarantees*.

22.3 In the event that the *Contractor* does not complete the *Work* or reach *Final Completion*, then the limit of the damages for delay or failure to meet *Performance Guarantees* that the *Owner* shall be entitled to is the aggregate limit of the *Liquidated Damages* set out in Section 22.1(d) whether such damages are payable as *Liquidated Damages* under this Article 22 or in the event of termination for cause under Article 36.

Article 23 - Warranty

23.1 If a defect in the *Facilities* is discovered during the *Warranty Period* and if the *Owner* has notified the *Contractor* in writing of such *Deficiency* promptly upon *Owner's* discovery but in any event no later than 30 days prior to the expiry of the *Warranty Period*, the *Contractor* shall, at its own risk and expense:

(a) remedy without delay such defect such that it comports with the *Owner's Requirements* and the *Contractor's* obligations hereunder;

(b) repair or replace any portion of the *Facilities* damaged as a result of such defect or damaged by the remedy of such defect;

(c) repair or replace all equipment, materials, supplies, or work performed by *Other Contractors*, damaged as a result of such defect, or damaged by the remedy of such defect; and

(d) repair or replace any property, including but not limited to land belonging to the *Owner*, or others, which is damaged as a result of the defect or damaged by the remedy of such defect.

23.2 Should the *Contractor* fail to remedy a defect, commence a remedy on a defect or provide an acceptable remedial plan to the *Owner*, in accordance with Section 23.1, within 14 days of the *Owner* providing a notice to the *Contractor* to remedy the same, the *Owner* may elect either to proceed with any activities necessary to remedy the defect or to accept the defect.

23.3 The *Contractor* further warrants any and all remedial work it performs in respect of defects appearing during the *Warranty Period* and, if longer, for a period of 12 months from completion of the remedial work. If this further warranty of remedial work expires more than 12 months after the expiry of the *Warranty Period,* any further remedial work shall be warranted only until the expiry of the further warranty and shall not be extended beyond such date by the preceding sentence.

23.4 The *Contractor* shall immediately advise the *Owner's Representative* of any defects in workmanship, defects, errors, omissions or mistakes in the *Work* that it discovers or becomes aware of during the *Contract Time* or the *Warranty Period*.

23.5 The *Contractor* shall perform its warranty obligations set forth in this Article 23 - Warranty in a manner that keeps disruptions to the *Owner's* continued operations at a minimum.

23.6 Neither acceptance of the *Work* by the *Owner*, nor payment for performance of the *Work,* shall relieve the *Contractor* from any responsibility for defects in the *Work.*

23.7 Except as set forth in this *Contract*, or any document executed in connection herewith, the parties disclaim all implied warranties and warranties imposed by *Law,* including warranties of merchantability and fitness for a particular purpose.

23.8 The *Owner* shall be liable to and shall indemnify the *Owner* for any and all reasonable losses, costs and expenses incurred by the *Owner* as a result of a breach of this Article 23 - Warranty, including any reasonable costs and expenses incurred by the *Owner* in remedying a defect under Section 23.2 and for any diminution of value of the *Work* where the *Owner* has elected to accept a defect under Section 23.2, and the *Owner* may retain and deduct such amount from payments or other monies due, or which may become due, to the *Contractor,* howsoever arising.

Article 24 - Compliance with Law

24.1 The *Contractor* shall act in accordance with all *Owner's Policies* and the *Law*.

24.2 Where there is a change in the *Law* or the *Owner's Policies* after the effective date of this *Contract*, the *Contractor* shall be responsible for ensuring that the *Work* complies with the *Law* and the *Owner's Policies*. If the *Contractor* considers such change in the *Law or* the *Owner's Policies* to have resulted in a *Change*, the *Contractor* may make a claim for such *Change* under Section 14.9.

24.3 The *Contractor* shall comply with and shall ensure that its employees and agents comply with and shall contractually require its *Subcontractors* and their respective employees and agents to comply with all applicable *Law* and *Owner's Policies* in connection with the *Work*.

24.4 The *Contractor* shall obtain from governmental authorities or other third parties, and pay for, those licenses, permits and approvals required by the *Law* and the *Contract* to perform the *Work*, except those licenses, permits and approvals required with respect to the land-use aspects of the *Work* to be performed on the *Work Site*, and except for any licenses, permits and approvals required by the *Contract* to be obtained by the *Owner* as stipulated in the *Owner's Requirements*.

24.5 Subject to Section 24.2, if the *Contractor* discovers any variance between the *Law* and any materials purchased or supplied by the *Contractor* or *Subcontractors*, the *Contractor* shall promptly notify the *Owner* before proceeding with the part of the *Work* affected, and shall make the necessary revisions to the materials to comply with the *Law*, at the *Contractor's* expense.

Article 25 - Safety and Loss Management

25.1 The *Owner* and the *Contractor* are committed to safety and the application of loss management principles in the conduct of their business. The parties recognize that excellence in safety and loss management can only be achieved through the active participation of everyone, including *Subcontractors* and their respective employees, consultants and agents.

25.2 The *Contractor* shall have the highest regard for safety, emergency procedures and loss management at all times during the performance of the *Work*. Accordingly, the *Contractor* shall at all times be responsible for safety and loss management in the performance of the *Work* and shall comply with all safety requirements specified in the *Contract*. Where the *Contractor* has control over the *Work Site*, the *Contractor* shall be responsible for protecting the employees of the *Owner*, the *Contractor*, *Other Contractors*, *Subcontractors*, visitors to the *Work Site* and the general public from injury or death and protecting the *Work Site*, the *Owner's* property and the property of third parties from loss or damage. Where the *Owner* requires control over the *Work Site* due to operational requirement, the *Owner* and *Contractor* will agree on *Work Site*-specific safety requirements and procedures, and each of them shall be responsible for compliance with such requirements and procedures by their respective employees and contractors.

25.3 The *Contractor* shall comply with the *Safety Plan* and any *Owner's Policies* relating to safety, emergency and loss management.

25.4 All employees of the *Contractor* and *Subcontractors* and all *Work Site* visitors must successfully complete any of the *Owner's* safety orientation courses and other similar courses stipulated in the *Owner's Requirements* before being allowed access to the *Work Site*, and it shall be the *Contractor's* responsibility to ensure that they have done so.

25.5 Subject to Section 25.6, *Contractor* shall be the "constructor", as that term is defined in the Occupational Health and Safety Act (Ontario), for the *Work* as stipulated in the *Owner's Requirements.*

25.6 Where the *Contractor* is stipulated as the "constructor" for the purposes of the Occupational Health and Safety Act (Ontario) in the *Owner's Requirements*, the *Owner* may take over the role of "constructor" at any time as may be stipulated in the *Owner's Requirements*.

25.7 For all *Work* performed on the *Work Site*, the *Contractor* shall have an alcohol and drug policy that is at least equivalent to the requirements of the *Owner's Policies*.

25.8 The *Owner* shall have the right to enter or occupy the *Work* in whole or in part for any purpose prior to *Functional Completion* or *Substantial Completion.* Such entry or occupation shall not be considered as acceptance of the *Work* or in any way relieve the *Contractor* from responsibility to complete the *Contract*. In exercising such right, where the *Contractor* is the "constructor" for the purposes of the Occupational Health and Safety Act (Ontario), the *Owner* shall comply with the *Contractor's* safety requirements and programs in such entry or occupation.

Article 26 - Work Area and Clean Up

26.1 The *Contractor* shall be responsible for keeping all its working and storage areas clean, orderly and secure.

26.2 The *Owner* is not responsible for theft, loss or damage to the *Contractor's* tools, equipment or materials howsoever caused, except where caused by the negligent act or omission of the *Owner* or those for whom in *Law* it is responsible.

26.3 The *Contractor* shall not, and shall ensure that its *Subcontractors* do not, use, transport, or store *Hazardous Material* at the *Work Site* except with the prior approval of the *Owner's Representative*. All *Hazardous Material* used, transported or stored shall be dealt with in accordance with, and the *Contractor* shall comply with, the *Law*, the *Contract* and the *Owner's Policies.*

26.4 During the performance of the *Work*, the *Contractor* shall comply fully with the *Contract* and the *Owner's Policies* regarding clean up. The *Contractor* shall clean up, remove and dispose of all surplus materials, containers, trash and debris resulting from the *Work*. Upon completion of the *Work*, or earlier termination of the *Contract*, the *Contractor* shall promptly clean up and remove all equipment, tools and surplus materials from the *Work*

Site as specified by the *Owner* and shall leave the *Work Site* clean and ready for the *Owner's* use and occupancy.

26.5 Notwithstanding anything in this *Contract* to the contrary, but subject to *Contractor's* compliance with Section 26.7, title to, ownership of, and legal responsibility and liability for *Pre-existing Hazardous Material* shall at all times remain with *Owner*. The *Owner* shall indemnify and save the *Contractor* harmless from all claims and demands, including legal fees on a solicitor-and-own-client (indemnity) basis arising out of *Pre-existing Hazardous Material*.

26.6 *Owner* shall, at *Owner's* sole expense and risk, arrange for handling, storage, transportation, treatment, and delivery for disposal of *Pre-existing Hazardous Material*. *Owner* shall be solely responsible for obtaining a disposal site for such material. *Owner* shall look to the disposal facility and transporter for any responsibility or liability arising from improper disposal or transportation of such material. *Owner* shall complete and execute any forms or certificates relating to regulated activities, including generation, storage, handling, treatment, transportation, or disposal of *Pre-existing Hazardous Material*.

26.7 If the *Contractor* encounters *Pre-existing Hazardous Material* at the *Work Site*, or has reasonable grounds to believe that *Pre-existing Hazardous Material* is present at the *Work Site*, the *Contractor* shall:

(a) take all reasonable steps, including stopping the *Work*, to ensure that no person's exposure to any *Hazardous Material* exceeds any applicable time-weighted levels prescribed by *Law*, and

(b) immediately report the circumstances to the *Owner* in writing.

Article 27 - Title and Responsibility

27.1 Except for any proprietary processes of the *Contractor* listed in Appendix A – SSG Scope of Work, all of the *Work* shall belong to the *Owner*, and accordingly the *Contractor* shall have no proprietary right or interest in the *Work*. The *Contractor* shall not use, copy or disclose any of the *Owner's Requirements* or the *Work* for any purpose other than performing the *Work*. Subject to the foregoing, the *Contractor* may retain for its own records a copy of the plans and specifications.

27.2 Notwithstanding Section 27.1, where a technology, process or work method belongs to, or is developed by the *Contractor* or *Subcontractor*, the proprietary rights to that technology, process or work method shall remain with the *Contractor* or *Subcontractor*, except where it has been created or developed or ownership of it has been acquired (a) during the term of this Contract and within the scope of the Work, (b) for the purposes of the Project or the Work or (c) based on the *Owner's Requirements* or *Confidential Information* provided by the *Owner*. Where proprietary rights remain with a party other than the *Owner*, then the *Owner* and its assignees shall, and are hereby granted, the right and irrevocable license without charge to have, retain and use information in respect thereof, for the purpose of the *Work* and the operation, repair, maintenance, re-building or renovation of the *Work* or any portion thereof. Nothing contained in this *Contract* shall be construed as limiting or

depriving *Contractor* of its rights to use its basic knowledge and skills to design or carry out other projects or work for itself or others, whether or not such other projects or work are similar to the work to be performed pursuant to this *Contract*.

27.3 Notwithstanding Section 27.1, or any other provision of the *Contract*, the *Contractor* shall be responsible for possession of the *Engineering Services* until received by the *Owner*. If the *Engineering Services*, or any part thereof is lost, damaged or destroyed prior to receipt by the *Owner*, then the *Engineering Services*, or portion thereof, as applicable, shall be promptly redone and replaced by the *Contractor*, at its expense, unless the loss, damage, or destruction was caused by the *Owner* or persons for whom in *Law* it is responsible.

27.4 Notwithstanding Section 27.1, the design and engineering, including drawings, specifications, and computer software, prepared by *Contractor* as part of the *Work* are not intended to be modified or represented to be suitable for reuse on extensions of the *Project* or any other project. Any such modification or reuse without prior written approval, and verification or adaptation by *Contractor* for the specific purpose intended, will be a breach of the license granted by *Contractor* under Section 28.4, and will be at *Owner's* sole risk and without liability or legal exposure to *Contractor*.

27.5 The title to all *Work* completed or in the course of construction at the *Work Site* and all *Goods*, except tools and equipment owned or rented by the *Contractor* or *Subcontractors* and not intended to be incorporated into the *Work*, shall become the property of the *Owner* upon the earlier of payment by the *Owner* on account thereof or delivery to the *Work Site*.

27.6 Notwithstanding the provisions of Section 27.5, until the *Owner* has issued a *Functional Completion Certificate*, a *Substantial Completion Certificate* or a *Final Completion Notice*, whichever is earlier, the *Contractor* shall retain all risk with respect to and be responsible for:

(a) all items supplied by the *Contractor* or its *Subcontractors* which are to be incorporated into the *Work* or used in performance of the *Work*;

(b) all items supplied by the *Owner* to the *Contractor* for incorporation into the *Work* or for use in performing the *Work*;

(c) all temporary structures or facilities used in the performance of the *Work*; and

(d) any *Work* completed or in progress.

27.7 No materials, supplies or equipment incorporated into the *Work* shall be subject to any general security agreement, chattel mortgage, financing contract or other agreement by which an interest therein is retained by the seller, or any other party.

27.8 Any files delivered in electronic medium may not work on systems and software different than those with which they were originally produced. *Contractor* makes no warranty as to the compatibility of these files with any other system or software. Because of the potential degradation of electronic medium over time, in the event of a conflict between the sealed original drawings and the electronic files, the sealed original drawings will govern.

Article 28 - Patents and Licenses

28.1 The *Contractor* shall indemnify and save the *Owner* harmless from all claims costs and demands, including legal fees on a solicitor-and-own-client (indemnity) basis, arising out of any patent, trademark, copyright or industrial design infringement pertaining to any equipment, machinery, materials, compositions, processes, methods or designs supplied by the *Contractor*, or its *Subcontractors*, in the performance of the *Work*.

28.2 The *Owner* shall indemnify and save the *Contractor* harmless from all claims and demands, including legal fees on a solicitor-and-own-client (indemnity) basis arising out of any patent, trademark, copyright or industrial design infringement pertaining to any equipment, machinery, materials, compositions, processes, methods or designs supplied or specified for use by the *Owner* to the *Contractor* for use in connection with the *Work*.

28.3 The *Contractor* shall promptly give notice to the *Owner* if the *Contractor* has or acquires knowledge of any patent, trademark, copyright or industrial design or similar right under which an action could reasonably be expected to be maintained because of the use or purchase by the *Owner* of equipment, machinery, materials, compositions, processes, methods or designs incorporated or to be incorporated by the *Contractor* as part of the *Work*. Following notification to the *Owner*, the *Contractor* shall not incorporate any such equipment, machinery, materials, compositions, processes, methods or designs into any plans, drawings, specification or other documents, or use the same in connection with the *Work* without the *Owner's* prior approval.

28.4 The *Contractor* grants the *Owner* a non-exclusive, royalty-free, perpetual, irrevocable (except in the event of a breach of this license) license for the purpose of operating and maintaining the *Facilities*:

(a) to use any and all patents, industrial designs, copyrights, designs, process and technology related to the *Work*, that the *Contractor* owns or controls; and

(b) to make, have made and use the equipment, machinery, materials, compositions, designs, methods and processes supplied by the *Contractor* under the *Contract*.

28.5 The rights granted to the *Owner* by the *Contractor* under Section 28.4 shall be assignable by the *Owner* to any party to whom the *Owner* may transfer all or part of title to the *Work* or the *Project*.

28.6 The *Owner* shall be entitled, at its own expense, to participate in or conduct the defence of any claim with respect to which it is entitled to indemnity under Section 28.1 or in respect of which it is required to indemnify the *Contractor* under Section 28.2 and to settle any claim for which it has accepted responsibility but the *Owner* shall not be liable to indemnify any other party for payment of any settlement unless it has consented to the settlement.

Article 29 - Confidential Information and Publicity

29.1 Each party shall keep all *Confidential Information* in confidence and shall not disclose it to others without the prior approval of the other party. The *Contractor* shall not use the *Confidential Information*, except in performance of the *Work*.

29.2 Notwithstanding Section 29.1, the *Contractor* may disclose *Confidential Information* to those of its employees, *Subcontractors* and their respective employees to whom disclosure is required in order for the *Contractor* to perform the *Work*, provided the *Contractor* shall ensure that its employees and agents comply with, and shall contractually require its *Subcontractors* and their respective employees and agents to comply with Section 29.1.

29.3 The *Contractor* shall not disclose any of the *Owner's Requirements* or the *Work* to others without the prior approval of the *Owner's Representative*, except as necessary to perform the *Work*.

29.4 Notwithstanding Section 29.1 or Section 29.3, *Confidential Information* may be disclosed by a party if that party is required to disclose the *Confidential Information* as a result of an arbitrator appointed under Appendix G – Dispute Resolution Procedure or an order of a court of competent jurisdiction. If disclosure is required by an arbitrator or an order of a court, the disclosing party shall provide the other party with immediate notice of such arbitration or court order and shall only disclose the minimum amount of *Confidential Information* to comply with the arbitration or court order.

29.5 The *Contractor* shall not use the *Owner's* name, or the names of any of its affiliates (as defined in the Business Corporations Act (Ontario) and the registered or unregistered trademarks of the *Owner* or its affiliates in any slogans or otherwise in any advertising or promotional materials or publicity releases, and shall not take, permit to be taken or use any photographs of the *Work Site*, without the prior approval of the *Owner's Representative*.

Article 30 - Proprietary Information

30.1 The *Contractor* shall keep and maintain adequate and current records of all *Proprietary Information*.

30.2 Subject to Section 27.1, the *Contractor* shall keep all *Proprietary Information* in confidence, shall not use it, or any part of it except in the performance of the *Work* and shall not disclose it to others, without the *Owner's* prior consent.

Article 31 - Force Majeure

31.1 Either the *Owner* or the *Contractor* may claim that an *Event of Force Majeure* has taken place, by giving the other party verbal notice within 5 *Work Days* of the knowledge that an *Event of Force Majeure* has affected or is likely to affect the *Work*, and, in addition, notice, together with a proposed plan of corrective action to resolve or minimize the effect of the *Event of Force Majeure*, within 10 *Work Days* of the *Event of Force Majeure*.

31.2 If the *Owner* has given a notice of an *Event of Force Majeure*, or the *Owner* agrees with a notice of an *Event of Force Majeure* issued by the *Contractor* that the *Work* or a portion thereof is affected by an *Event of Force Majeure*, then the *Owner* shall:

(a) cause the *Contractor* to complete the *Work*, with such time adjustments to the *Contract Time* as are required by the *Event of Force Majeure*; or

(b) suspend the *Work* or any portion thereof in accordance with Article 34 - Suspension; or

(c) terminate the *Contract* or any portion thereof in accordance with Section 35.1 and Section 36.5(e).

31.3 If the *Owner* does not agree that the *Work* or any portion of the *Work* is affected as a result of an *Event of Force Majeure* for which the *Contractor* has given notice under Section 31.2, then the *Contractor* shall complete the *Work* in accordance with the *Execution Plan* and may request an adjustment to the *Contract Time* and the *Compensation* in the manner provided in Section 14.9.

31.4 If an *Event of Force Majeure* exists and continues for a period in excess of 180 continuous *Work Days* and results in substantially all of the *Work* being stopped or suspended during that period, the *Contractor* may terminate the *Contract* and the *Owner* shall pay the *Contractor* for the *Work* performed to the date of termination.

31.5 Any delay or failure on the part of either the *Owner* or the *Contractor* which is a result of an *Event of Force Majeure*, shall not constitute default hereunder or give rise to any claim for damages or result in any increase to the *Compensation*.

Article 32 - Delays Caused by the Contractor

32.1 If the *Contractor* is responsible for a delay in the progress of the *Work*, or fails to complete any portion of the *Work* within the time limits set forth in the *Execution Plan*, then the *Contractor* shall, at no additional cost to the *Owner*, provide a recovery plan and perform whatever acts are required or requested by the *Owner's Representative* to make up the lost time and to avoid any further delay in the performance of the *Work*, including, without limitation, work overtime, and acquire and use any necessary additional labour and equipment.

Article 33 - Delays not Caused by the Contractor

33.1 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Owner* or *Other Contractors*, contrary to the provisions of the *Contract*, or by an *Epidemic*, then the *Contract Time* shall be extended for such reasonable time as may be necessary to allow the *Contractor* to make up the delay and the *Compensation* shall be adjusted by such reasonable amount as may be necessary to compensate the *Contractor* for its increased costs.

33.2 If the *Contractor* is delayed in the performance of the *Work* by an order issued by a court or other public authority having jurisdiction, providing that such order was not issued as the result of an act or fault of the *Contractor* or any person employed or engaged by the *Contractor* directly or indirectly, then the *Contract Time* shall be extended as agreed by the parties or as resolved under Appendix G – Dispute Resolution Procedure.

33.3 If the *Contractor* is forced to shut down all or a portion of its operation by reason of:

(a) any act or omission of the *Owner* or of any *Other Contractor*;

(b) failure of the *Owner* to provide the *Work Site*; or

(c) an error or omission in the *Owner's Requirements*; then

the *Contractor* shall give to the *Owner* notice of such shut-down, within 1 *Work Day* of such shut-down, indicating the number and classification of persons and number and description of equipment affected thereby.

33.4 In the event of a delay pursuant to Section 33.3, the *Contractor* shall be reimbursed by the *Owner* in accordance with the rates set out in Appendix B – Compensation or its reasonable costs incurred.

33.5 No claim for delay and no extension of time on account of delay shall be made by the *Contractor* unless notice of claim with a *Change Quotation* is given to the *Owner* not later than 10 *Work Days* after the commencement of delay, provided however, that in the case of a continuing cause of delay only one notice of claim shall be necessary.

Article 34 - Suspension

34.1 In addition to any other right that the *Owner* may have under the *Contract* or in *Law*, the *Owner* may, at any time or times, by notice to the *Contractor* specifying the effective date of the suspension, require the *Contractor* to suspend the *Work*, or any portion thereof.

34.2 Upon providing notice under Section 34.1, the *Owner* shall arrange to promptly discuss with the *Contractor* the specific requirements of the suspension and whether or not the *Owner* anticipates that demobilization, remobilization or idle equipment or personnel will occur as a result of the suspension.

34.3 Upon receiving notice, the *Contractor* shall discontinue the *Suspended Work*, place no further purchase orders or subcontracts with respect to the *Suspended Work*, and promptly make reasonable efforts to obtain suspension terms satisfactory to the *Owner* with respect to all purchase orders, subcontracts, supply contracts and rental agreements related to the *Suspended Work*. The *Contractor* shall continue to perform all other portions of the *Work* which have not been suspended by the *Owner*.

34.4 Where requested by the *Owner*, the *Contractor* shall advise the *Owner* of:

(a) the number of the *Contractor's* personnel made idle by the suspension;

(b) the labour costs resulting from the *Contractor's* personnel made idle by the suspension;

(c) transportation costs for the *Contractor's* personnel released during the suspension;

(d) the equipment made idle and associated equipment costs resulting from the suspension; and

(e) any other costing, labour, material or equipment information relating to the suspension that the *Owner* may require.

34.5 The *Owner* may at any time authorize resumption of the *Suspended Work* or any part thereof, by giving the *Contractor* reasonable notice specifying the part of the *Suspended Work* to be resumed and the effective date of such resumption. The *Contractor* shall resume the *Suspended Work* on the date and to the extent specified in the notice provided that if the date for resumption is more than 180 days after the date of suspension, the *Contractor* may, by *Change Quotation* given within 10 Work Days of receipt of the notice of resumption, request a *Change Order* deleting the *Suspended Work* from the *Contract*.

34.6 The *Contractor* shall use its employees, equipment and materials in such manner, and take such other steps as may be necessary or desirable to minimize the costs associated with the *Suspended Work*. During the period of *Suspended Work*, the *Contractor* shall secure and protect the *Suspended Work* and all materials and equipment to be used or incorporated therein.

34.7 In relation to *Suspended Work*, the *Owner* shall reimburse the *Contractor* for those costs, exclusive of profit, reasonably incurred by the *Contractor* as a direct result of the suspension of the *Work* in accordance with Appendix B – Compensation. The *Owner* shall not be liable for any damages or loss of profits on account of the *Suspended Work* or any part thereof, or the deletion of *Suspended Work* from the *Contract*.

Article 35 - Termination for Convenience

35.1 In addition to any other rights that the *Owner* may have under the *Contract* or in *Law*, the *Owner* may, at any time, terminate the *Contract*, the *Work* or any portion thereof by giving notice to the *Contractor* specifying the *Work* or portion thereof to be terminated and the effective date of the termination.

35.2 In addition to any other rights that the *Contractor* may have under the *Contract* or in *Law*, the *Contractor* may, at any time that is at least 90 days after the delivery a notice in accordance with Section 6.4 of Appendix B – Compensation, terminate the *Contract* with immediate effect by giving notice to the *Owner* specifying same.

35.3 Upon receipt of a notice under Section 35.1 or delivery of a notice under Section 35.2, the *Contractor* shall discontinue the *Work* in accordance with the notice, and shall take whatever steps are necessary or desirable to terminate the *Work* in a safe, cost effective and timely manner with due consideration to environmental impacts. The *Contractor* shall continue to perform all other portions of the *Work* not terminated, if any, in accordance with the *Contract*.

35.4 As full and final settlement of any damages that may be claimed by the *Contractor* as a result of a termination under this Article 35 - Termination for Convenience:

(a) where the *Owner's* ICM (Incremental Capital Module) application with respect to the *Project* has not been approved at the time of termination, the *Contractor* will not be entitled to any compensation or reimbursement;

(b) where *Owner's* ICM (Incremental Capital Module) application with respect to the *Project* has been approved but the *Owner* has not issued the *Notice to Proceed with Upfront Engineering* at the time of termination, the *Owner* will reimburse the

Contractor for 50% of the amount attributed to SMARTStart line item in Table 2: Breakdown of Maximum Price in Appendix B – Compensation; and

(c) in all other cases, the *Owner* shall reimburse the *Contractor* for those costs reasonably incurred by the *Contractor* as a direct result of the termination of the *Contract*, the *Work*, or any portion thereof.

Article 36 - Termination for Cause

36.1 Without limiting the generality of Section 35.1, the *Owner* may immediately terminate the *Contract* by written notice to the *Contractor* in any of the following circumstances:

(a) if the *Contractor* becomes insolvent or makes a general assignment for the benefit of its creditors, enters into a plan of arrangement for the benefit of its creditors or otherwise acknowledges its insolvency or if a bankruptcy or receiving order is filed or made against the *Contractor*;

(b) if an order is made or resolution is passed for the winding up or liquidation of the *Contractor*;

(c) if a custodian, receiver, manager or other officer with similar powers is appointed in respect of the *Contractor* or any of the *Contractor's* property;

(d) if the *Contractor* ceases to carry on business in the ordinary course; and

(e) if a creditor takes possession of any of the *Contractor's* property or if a distress, execution or any similar process is levied or enforced against such property and remains unsatisfied by the *Contractor*.

36.2 Upon receipt of a notice pursuant to Section 36.1, the *Contractor* shall discontinue the *Work* in accordance with the notice, and shall take such steps as may be necessary or desirable to minimize the costs associated with the termination of the *Work*.

36.3 In addition to any rights the *Owner* may have at *Law*, if the *Contractor* is in default in carrying out any of the material terms, conditions, covenants or obligations of the *Contract*, or has made a material false representation, declaration or warranty, the *Owner* may give the *Contractor* notice of d efault.

36.4 Where the *Owner* gives the *Contractor* a notice of default pursuant to Section 36.3, the *Contractor* shall have 10 *Work Days* immediately following receipt of the notice, or such longer time as the *Owner* determines to be reasonable and has specified in the notice of default or has subsequently agreed upon in writing, to remedy such default, or commence to prosecute a remedy. If the *Contractor* fails to remedy the default, the *Owner* may by 10 *Work Days* notice to the *Contractor* terminate the whole or any part of the *Contract*.

36.5 In the event the *Contract* or any portion of the *Work* is terminated pursuant to Section 36.1 or Section 36.4:

(a) the *Contractor* shall discontinue the *Work* in accordance with the notice and shall take such steps as may be necessary or desirable to minimize the costs to the *Owner* associated with the termination of the *Work* and the *Owner* shall not be liable for those costs incurred by the *Contractor* as a result of the termination of the *Work*;

(b) the *Owner* shall have the right to take possession of the *Goods* and the *Contractor's* equipment, materials and plant and shall have the right to use the same to complete the *Work*;

(c) the *Contractor* shall execute and deliver to the *Owner* all documents required by the *Owner*, and shall take all steps required by the *Owner*, to assign to and fully vest in the *Owner* the rights and benefits of the *Contractor* under existing agreements with the *Contractor's Subcontractors*, which are related to the *Work*.

(d) the *Owner* may complete or have others complete the *Work* at the *Contractor's* expense (subject to Sections 42.3 and 42.4);

(e) the *Owner* shall pay the *Contractor* for all *Work* satisfactorily performed to the date of termination, in accordance with Article 13 - Payment, less the sum of any monies already paid to the *Contractor* and any additional cost, loss or expense, including legal fees on a solicitor-and-own-client (indemnity) basis, that the *Owner* incurs, suffers or sustains, including (but subject to Sections 42.3 and 42.4) any amount the *Owner* must pay to obtain satisfactory completion of the *Work* by others;

(f) the *Owner* shall not be liable for any penalties, damages or loss of profits as a result of the termination of the *Work* or the *Contract* by the *Owner*.

36.6 The *Contractor* may immediately terminate the *Contract* by written notice to the *Owner* in any of the following circumstances:

(a) if the *Owner* becomes insolvent or makes a general assignment for the benefit of its creditors, enters into a plan of arrangement for the benefit of its creditors or otherwise acknowledges its insolvency or if a bankruptcy or receiving order is filed or made against the *Owner*;

(b) if an order is made or resolution is passed for the winding up or liquidation of the *Owner*;

(c) if a custodian, receiver, manager or other officer with similar powers is appointed in respect of the *Owner* or any of the *Owner's* property;

(d) if the *Owner* ceases to carry on business in the ordinary course; and

(e) if a creditor takes possession of any of the *Owner's* property or if a distress, execution or any similar process is levied or enforced against such property and remains unsatisfied by the *Owner*.

36.7 As full and final settlement of any damages that may be claimed by the *Contractor* as a result of such termination, the *Owner* shall reimburse the *Contractor* for those costs

reasonably incurred by the *Contractor* as a direct result of the termination of the *Contract*, the *Work*, or any portion thereof.

36.8 Subject to a legitimate dispute between the parties, or a dispute being pursued in accordance with Appendix G – Dispute Resolution Procedure, should the *Owner* be in material default of its obligations under this *Contract*, including the payment obligations of the *Owner* hereunder, the *Contractor* may provide a notice in 20 *Work Days* to the *Owner* that should the material default not be remedied, or the *Owner* commence to prosecute a remedy in relation to the material default, that the *Contractor* may suspend or terminate the *Contractor's* obligations under the *Contract*.

36.9 The rights and remedies provided in this Article 36 - Termination for Cause are in addition to the rights and remedies provided by the *Law*, or under any other provision of the *Contract*.

Article 37 - Taxes

37.1 The *Contractor* shall be responsible for the payment of:

(a) all taxes imposed by reason of the performance or completion of the *Work* including but not limited to license, permit and registration fees and the *Contractor's* income, profit, franchise, business, and personal property taxes;

(b) all employment taxes and contributions imposed by the *Law* or required to be paid on behalf of the employees of the *Contractor* or its *Subcontractors*, including but not limited to taxes and contributions for income tax, workers' compensation, unemployment insurance, old age benefits, welfare funds, pensions and annuities and disability insurance;

(c) all taxes, other than property taxes, on the *Work Site* and arising out of the *Work*, to the date of *Substantial Completion*; and

(d) all customs, sales and excise taxes and duties owing with respect to any labour, machinery, materials and equipment to be supplied by the *Contractor* and used in performance of or incorporated into the *Work*, except for goods and services tax payable by the *Owner* with respect to payments due to the *Contractor*.

37.2 Any increase in taxes and charges described in Section 37.1(a) and Section 37.1(b) shall be the sole responsibility of the *Contractor*. In the event of an increase in taxes or charges described in Section 37.1(c), the *Contractor* shall be entitled to a *Change Order* altering the *Compensation* to account for the difference between the amount of tax that would have been payable by the *Contractor* as of the effective date of this *Contract* and the actual amount of tax that becomes payable as a result of the tax increase.

37.3 The *Contractor* shall indemnify and hold the *Owner* harmless from any liability resulting from the failure of the *Contractor* or its *Subcontractors* to make timely payments of the items referred to in this Section or such similar items for which the *Contractor* is responsible. Any interest, penalties or other liabilities arising from such failure shall be the sole responsibility of and be paid for by the *Contractor*.

37.4 The *Compensation* shall be exclusive of any Goods and Services Tax ("GST"), Harmonized Sales Tax ("HST"), or any similar taxes that may be assessed on the *Work*. Such taxes shall be payable to *Contractor* in addition to the *Compensation* otherwise payable under this *Contract* and they shall be stated in a separate line.

Article 38 - Workers' Compensation

38.1 The *Contractor* shall ensure all its employees and representatives engaged in the performance of the *Work* are registered for workers' compensation coverage in accordance with the statutory requirements of the Province of Ontario.

38.2 The *Contractor* shall at all times pay or cause to be paid any assessment or contribution required to be paid pursuant to the Workers' Compensation Act (Ontario) and upon failure to do so, the *Owner*, in addition to any other rights it may have at *Law* or under the *Contract*, may retain the amount of such assessment or contribution from the *Compensation*.

38.3 The *Contractor* shall indemnify and save harmless the *Owner* from all workers' compensation assessments due by the *Contractor* in relation to the *Work*.

Article 39 - Liens

39.1 The *Contractor* shall at all times reimburse, protect, indemnify and save free and harmless the *Owner*, the *Work Site* and the other lands and property of the *Owner* from and against all liens and claims made or liability incurred by the *Owner* on account of the *Work* performed or materials supplied by employees of the *Contractor* and *Subcontractors*, or on account of an exaggerated lien filed by the *Contractor*, including, without limitation, legal fees on a solicitor-and-own-client (indemnity) basis. The *Contractor* shall cause any such lien or claim which may be filed or made, to be released and discharged forthwith at the expense of the *Contractor*. If the *Contractor* fails to release or obtain the release and discharge of any such lien or claim, then the *Owner* may, but shall not be obliged to, discharge, release or otherwise deal with the lien or claim, and the *Contractor* shall pay any and all reasonable costs and expenses incurred by the *Owner* in so releasing, discharging or otherwise dealing with the claim or lien, including but not limited to, legal fees on a solicitor-and-own-client (indemnity) basis. Any amounts so paid by the *Owner* may be deducted from any amounts due to the *Contractor* whether under the *Contract* or otherwise.

Article 40 - Survival

40.1 If the *Contract* or any part of the *Work* is terminated pursuant to Article 35 - Termination for Convenience or Article 36 - Termination for Cause, then Article 23 - Warranty shall survive such termination, and the *Warranty Period*, with respect to the *Work* or a *System* which has received a *Functional Completion Certificate*, shall remain in effect notwithstanding the termination of this *Contract*.

40.2 Any terms, covenants, provisions or conditions of the *Contract* which expressly or by their nature survive the termination of the *Contract* shall continue in full force and effect subsequent to and notwithstanding such termination, and shall not be merged with the

termination, until such terms, covenants, provisions and conditions are satisfied or by their nature expire.

Article 41 - Liability and Indemnity for Third Party Claims

41.1 The *Contractor* shall be liable to and shall indemnify, and hold harmless the *Owner*, its officers, directors, employees, consultants and agents for all losses, damages and expenses, including legal fees on a solicitor-and-own-client (indemnity) basis, which they or any of them may incur as a result of claims, demands, actions or proceedings made or taken against them by persons not party to the *Contract* for:

(a) any negligent acts or omissions in connection with the performance, purported performance or non-performance of the *Contract* or of the *Work* by the *Contractor* or its *Subcontractors* or their respective employees or agents;

(b) any acts or omissions of the *Owner*, *Other Contractors* or their respective employees or agents, while acting under the direction and control of the *Contractor*, its *Subcontractors* or their respective employees or agents;

(c) any liability, claims, damages, costs and expenses arising from the failure of the *Contractor* or its *Subcontractors*, or their respective employees or agents to comply with the *Law*; or

(d) *Previous Claims*.

41.2 The *Contractor* shall, at its sole expense, if requested by the *Owner*, defend those persons entitled to be indemnified pursuant to Section 41.1. The *Owner* shall have the right, if it so elects, to participate in any such defence at its own cost and the *Contractor* shall have the right to settle claims to a maximum of $100,000 without first consulting with the *Owner* and thereafter only with the consent of the *Owner* which shall not be unreasonably withheld.

41.3 In the event that the *Contractor* fails to defend those persons entitled to be indemnified pursuant to Section 41.1, as required by Section 41.2, or to conduct such a defence in a commercially reasonable manner, then the *Owner* may settle the claim, demand, action or proceeding in such amount as it considers reasonable without prejudice to the rights of indemnity hereunder.

41.4 The *Owner* shall indemnify and hold harmless the *Contractor*, its *Subcontractors*, and their respective officers and directors from and against all claims, demands, losses, damages, expenses, actions and proceedings made or taken by persons not party to the *Contract* and which arise on account of and are attributable to the *Owner's* obligations hereunder, including, without limitation any action for which the *Owner* must indemnify the *Contractor* pursuant to Section 28.2 or Section 26.5.

41.5 In the event that the *Owner* accepts the responsibility to indemnify the *Contractor*, its *Subcontractors*, officers and directors pursuant to Section 41.3, then it shall be entitled to retain and instruct counsel to act for and on behalf of those persons and to settle, compromise and pay any claim, demand, action or proceeding; however, such settlement,

compromise or payment must be approved by *Contractor* or its *Subcontractors* (which approval shall not be unreasonably withheld). The *Contractor* shall and shall cause any indemnified party to reasonably co-operate in all respects in contesting any third party claim for which the *Owner* has accepted responsibility.

Article 42 - Limitations of Liability

42.1 The *Contractor* agrees that, as of the date hereof, there are no existing, current or contemplated claims, demands, suits, action or causes of action, whether arising in contract, tort or otherwise, from or involving the *Contractor* or its *Affiliates* against the *Owner* or its *Affiliates* ("Previous Claims") and hereby irrevocably waives the right to make any such Previous Claim against the *Owner* or its *Affiliates*.

42.2 Subject to Section 42.4, except for *Liquidated Damages* and except to the extent to which coverage is provided by a project-specific policy or policies of insurance, as applicable, the *Contractor*, its *Subcontractors*, and their respective officers and directors shall not be liable to the *Owner*, or anyone claiming through or under it, whether by way of indemnity or by reason of breach of contract or in tort, including liability for negligence and breach of statutory duty, or on any other legal or equitable basis, for:

(a) special, punitive, indirect, economic or consequential loss or damage;

(b) loss of use, whether complete or partial, of the *Work* or existing facilities of the *Owner* or third parties;

(c) loss of product;

(d) loss of revenue, overhead and profit; or

(e) loss of any contract that may be suffered by the *Owner*.

42.3 Subject to Section 42.4, except to the extent to which coverage is provided by project-specific policy or policies of insurance, the *Contractor's* total aggregate liability to the *Owner* shall be limited to the amount of the *Fixed Price*, or until agreement on the *Fixed Price*, the amount of the *Upfront Engineering Fixed Price*.

42.4 The limitations of liability set out in Sections 42.1 and 42.3 and the exclusion of remedies set out in 42.6 (and all other releases, waivers and limitations expressed in this *Contract* concerning liability and remedies) shall not apply to any liability of the *Contractor*, its *Subcontractors*, and their respective officers and directors or any right or remedy of *Owner* arising out of or under:

(a) wilful misconduct;

(b) act or omission contrary to the *Law*;

(c) Section 28.1 (intellectual property infringement);

(d) Section 39.1 (liens);

(e) Section 41.1 (third party claims);

(f) Section 45.3 (independent contract indemnity);

(g) obligations set out in this *Contract* to obtain and maintain any project-specific insurance;

(h) obligations relating to workers' compensation premiums;

(i) obligations to pay taxes.

42.5 Any and all rights and remedies of the parties as set forth in any provision of the *Contract* are cumulative and are in addition to any other rights and remedies of the parties under any other provision of the *Contract*.

42.6 Further, but without prejudice to any right to claim under any applicable policy of insurance:

(a) the remedies set forth in the following provisions of *Contract* for failure of a party to satisfy certain obligations arising under this *Contract* are the exclusive remedies of the other party for any such failure, notwithstanding any remedy that would otherwise be available at law or equity: Article 22 - Liquidated Damages and Article 23 - Warranty; and

(b) the parties rights to terminate this *Contract* shall be limited to those rights set out in Article 35 - Termination for Convenience and Article 36 - Termination for Cause, notwithstanding any right to terminate that would otherwise be available at law or equity, and in no event shall this *Contract* be cancelled or rescinded.

42.7 To the extent a right or remedy is not expressly set forth in this *Contract* for a breach of an obligation arising under this *Contract*, the parties shall have any right or remedy available under the governing law of contracts.

Article 43 - Insurance Provided by Contractor

43.1 The *Contractor* shall, and shall ensure that its *Subcontractors* shall, without limiting any of the obligations or liabilities under the *Contract*, continuously carry during the performance of the relevant *Work* and any time the *Contractor* or its *Subcontractors* are on the *Work Site*, at their own expense and cost, the following insurance coverage with limits where applicable in amounts reasonably applicable to the individual *Subcontractor's* scope of work:

(a) commercial general liability insurance covering *Contractor*, *Subcontractor* and *Owner* in respect of any operations in connection with the *Contract* on an occurrence basis with a combined single limit not less than $10,000,000 inclusive of each accident or occurrence for bodily injury, including death, personal injury and damage

to property, including loss of use thereof and in the aggregate for products and completed operations; such coverage shall include but not be limited to the following:

(i) blanket contractual liability;

(ii) sudden and accidental pollution liability;

(iii) products and completed operations including a provision that such coverage is to be maintained for a period not less than 24 months from the date of issuance of the *Substantial Completion Certificate;*

(iv) broad form completed operations;

(v) employers liability;

(vi) non-owned automobile liability;

(vii) broad form property damage;

(viii) blasting, pile driving, caisson work, underground work (XCU coverage); and

(ix) cross liability and severability of interest; and

(b) workers' compensation coverage for all employees engaged in the *Work* in accordance with the statutory requirements of the Province of Ontario;

(c) employer's liability coverage for all employees engaged on the *Work Site* and not covered by workers' compensation, in the amount of $10,000,000;

(d) automobile liability insurance covering all licensed motor vehicles owned or leased having a limit of not less than $5,000,000 inclusive per occurrence for bodily injury, death, and damage to property;

(e) if relevant for the *Work*, aircraft and watercraft liability insurance covering all owned or non-owned aircraft and watercraft if used directly or indirectly in the performance of the *Work* having a limit of $10,000,000 inclusive per occurrence for bodily injury, death, and damage to property and $10,000,000 for aircraft passenger hazard;

(f) property and contractor's equipment insurance covering property, equipment, tools and construction machinery owned, rented or leased by and to be used for the performance of the *Work*, excluding all machinery, materials and supplies at the *Work Site* or in transit thereto and intended to become a part of the finished *Work*, for the full replacement cost value of such property on an "all risks" basis;

(g) professional errors & omissions insurance in an amount of $10,000,000 for each claim and in the annual aggregate for the *Project* covering the period from start of *Engineering Services* until *Substantial Completion* of the *Work* and for a further discovery period of two years from the issuance of the *Substantial Completion Certificate*;

(h) network/information security liability insurance in an amount not less than $1,000,000; such coverage shall include cyber liability for unauthorized access, security breach, etc., including but not limited to such occurrences caused by *Contractor*;

(i) environmental liability insurance with limits of not less than $2,000,000 per occurrence and in the annual aggregate or limits carried, whichever are greater.

(j) course of construction and transit insurance to a limit of the value of the full replacement cost of the *Work* covering all risks of direct physical loss or damage to the *Work* and *Goods*, including temporary or off-site storage and project lay-down areas, and all temporary structures used in the erection of the *Work* including while in transit to and from the *Work Site* or in storage while at the *Work Site*, before and during erection and until completed and while awaiting tests and during testing and commissioning until issuance of a *Final Completion Notice*. *Owner* shall be named as an Additional Interest to the policy;

43.2 The Parties agree that that all insurance provided by the *Contractor* and its *Subcontractors* pursuant to Section 43.1 is primary and not contributory with, or in excess of, any other insurance carried by the *Owner*.

43.3 Where a claim is paid by the insurer in respect of losses for which coverage is provided under Section 43.1:

(a) the *Contractor* shall be responsible for the deductibles relating to insurance proceeds under the insurance required pursuant to Sections 43.1(c), 43.1(d), 43.1(e), 43.1(f) and 43.1(g);

(b) the *Contractor* shall be responsible for the deductibles relating to insurance proceeds for damage to the *Work* until a *Substantial Completion Certificate* is issued;

(c) the *Owner* shall be responsible for the deductibles relating to insurance proceeds for damage to the *Work* after a *Substantial Completion Certificate* is issued;

(d) the *Owner* shall be responsible for the deductibles relating to insurance proceeds for damage to the *Owner's* property; and

(e) the negligent party or parties shall be responsible for the deductibles relating to insurance proceeds for damage to third parties.

43.4 *Contractor* and its *Subcontractors* shall satisfy themselves as to the coverage afforded by such policies and the adequacy thereof.

43.5 The *Compensation* shall include the cost of premiums for the insurance to be provided by the *Contractor*.

43.6 The *Contractor* shall, and shall ensure that its *Subcontractors* shall:

(a) provide the *Owner* with certificates of insurance

(i) for the policies described in Section 43.1(a), 43.1(b), and 43.1(g) within 10 *Work Days* of receipt of the *Notice to Proceed with Upfront Engineering* or prior to the commencement of the *Upfront Engineering Services*, whichever is earlier, and certificates of insurance evidencing renewal of these policies within 10 *Work Days* of their expiry date where such policies expire prior to *Substantial Completion*;

(ii) for the policies described in Section 43.1(c), 43.1(d), 43.1(e), 43.1(f), 43.1(h), 43.1(i) and 43.1(j) within 10 *Work Days* of receipt of the *Notice to Proceed with Balance of Work* or prior to the commencement of the *Balance of Work*, whichever is earlier, and certificates of insurance evidencing renewal of these policies within 10 *Work Days* of their expiry date where such policies expire prior to *Substantial Completion*; provided that the *Owner* may by *Change Order* or *Change Directive* require such policies to be in place earlier;

(b) place all policies with insurers which are licensed to provide insurance in the Province of Ontario with an A.M. Best or alternative rating acceptable to the *Owner* of no less than A-, and in a form acceptable to the *Owner*;

(c) ensure that such policies provide for at least 30 days' prior written notice to the *Owner* of cancellation or change that is material to the *Contract*;

(d) require that the dollar amount of the deductible in the project-specific policies for any one loss shall be subject to the approval of the *Owner*; and

(e) require that a waiver of subrogation in favour of the *Owner*, its officers, directors, employees, consultants and agents in respect of the insurance coverage required under Section 43.1(f).

43.7 If the *Contractor* or its *Subcontractors* fail to furnish the *Owner* with a certificate of insurance for each policy required to be obtained and continually carried, or if after furnishing the certificates of insurance, the policies lapse, are cancelled, or are materially changed, then in every case the *Owner* may, but shall not be obligated to, obtain and maintain such insurance in the name of the *Contractor* or any *Subcontractor*. The cost thereof (including *Subcontractor's* insurance costs) shall be payable by the *Contractor* to the *Owner* on demand, and the *Owner* may at its election deduct the cost from any monies which are due or may become due to the *Contractor*.

43.8 Neither the providing of insurance by the *Contractor* in accordance with the requirements of this Article 43 - Insurance Provided by Contractor, nor the insolvency, bankruptcy, or failure of any insurance company to pay any claim shall be held to relieve the *Contractor* from any other provisions of the *Contract* with respect to liability of the *Contractor*, or otherwise.

43.9 As part of the *Upfront Engineering Services*, the *Contractor* shall assist the *Owner* in finalizing the insurance required to be in put in place by the parties for the *Balance of the Work.* Any agreed changes to Article 43 - Insurance Provided by Contractor or Article 44

– Insurance Provided by Owner shall be documented in the *Notice to Proceed with Balance of Work.*

Article 44 - Insurance Provided by Owner

44.1 The *Owner* shall obtain and, during the progress of the *Balance of the Work*, maintain in force the following policies of insurance, with the *Owner* as named insured and with the *Contractor* and its *Subcontractors* as additional insureds:

(a) general liability policy covering *Owner's* off-site works or off-project works with a $2 million per incident/$4 million aggregate limit

(b) permanent property cover for *Owner's* existing property.

44.2 All insurance policies provided by the *Owner* shall be written to prohibit the insurer from obtaining subrogation or transfer of rights in respect of any claim under such policies against the *Contractor*, *Subcontractors*, or their employees, directors or officers who are employed in the performance of the *Work.*

44.3 The *Owner* shall:

(a) provide the *Contractor* with certificates of insurance for the policies described in Section 44.1 within 10 *Work Days* of *Notice to Proceed with Balance of Work* or prior to the commencement of the *Balance of Work,* whichever is earlier, and certificates of insurance evidencing renewal of these policies within 10 *Work Days* of their expiry date where such policies expire prior to *Substantial Completion;* and

(b) ensure that such policies provide for at least 30 days' prior written notice to the *Contractor* of cancellation or change that is material to the *Contract*.

44.4 The insurance protection provided by the *Owner* in accordance with Article 44 – Insurance Provided by Owner shall be primary with respect to any loss or damage which at the time of the occurrence is covered by the *Owner's* insurance policies.

Article 45 - Independent Contractor

45.1 For the purposes of the *Contract* and the *Work*, the *Contractor* shall be an independent contractor and not the agent or employee of the *Owner*.

45.2 All persons employed or retained by the *Contractor* in connection with the performance of its obligations shall be its employees or those of its *Subcontractors*, as the case may be.

45.3 The *Contractor* shall indemnify and hold harmless the *Owner*, against all claims, demands, losses, damages, expenses, actions and proceedings whatsoever, including legal fees on a solicitor-and-own-client (indemnity) basis, which may be incurred by the *Owner* as a result of any determination by any tribunal or court that any personnel provided by the *Contractor* pursuant to the terms of this *Contract* are for any purposes agents or employees of the *Owner*, except to the extent that the *Owner's Requirements* specify that the *Contractor* shall act as the *Owner's* agent in relation to the procurement of *Goods*.

45.4 The *Contractor* shall have no authority whatsoever to make any statement, representation or commitment of any kind, or to take any action, which may be binding on the *Owner*, except as provided for in this *Contract*, as authorized in writing by the *Owner* or in connection with the procurement of *Goods* where the *Owner's Requirements* specify that the *Contractor* shall act as the *Owner's* agent.

Article 46 - Conflict of Interest

46.1 The *Contractor* shall exercise reasonable care and diligence to prevent any actions or conditions which could result in a conflict with the *Owner's* interests. This obligation shall apply to the activities of the *Contractor* and its *Subcontractors* and their respective employees and agents, in their relations or dealings with the employees of the *Owner* and their families, and other third parties, arising from the *Contract* or the performance of the *Work*. The efforts made by the *Contractor* in this regard shall include, but shall not be limited to, establishing reasonable precautions to prevent *Subcontractors* and their respective employees from offering, or providing entertainment, gifts, loans, payments or other considerations to the *Owner's* employees, consultants and agents or their family members.

Article 47 - Audit Access

47.1 The *Contractor* shall preserve the *Records* in good order during the *Contract Time* and for a period of 7 years thereafter.

47.2 The *Contractor* shall permit authorized representatives of the *Owner* to review the *Records* at all reasonable times during the *Contract Time*, and for a period of two years thereafter for the purposes of:

(a) determining the *Contractor's* compliance with all of the terms of the *Contract*, including, but not limited to:

(i) Article 14 - Changes and Article 32 - Delays Caused by the Contractor; and

(ii) the *Owner's Policies*; and

(b) verifying of all *Work* performed and all reimbursable costs and other charges payable under the *Contract*.

47.3 Where the *Compensation* is not on a cost reimbursable basis, the *Contractor* may black-out any information in the *Records* relating to price before access is given to the *Owner*.

Article 48 - Representatives and Notices

48.1 [redacted]

48.2 [redacted]

48.3 [redacted]

(a) [redacted]

48.4 Either party may change its contact information for the purposes of Section 48.3 by providing the other party with 10 days notice of such a change.

48.5 Invoices and all supporting documentation shall be mailed or delivered to the *Owner's Representative* at the address shown above.

48.6 E-mail, where such electronic transmission meets the minimum requirements set forth in the Electronic Commerce Act (Ontario) may be used for communication between the parties.

Article 49 - General

49.1 No failure or delay on the part of either party in exercising any right, power or privilege hereunder shall operate as a waiver thereof.

49.2 No waiver of any right, power or privilege by a party shall limit or affect that party's rights with respect to any breach of the *Contract* by the other party.

49.3 Subject to Section 42.4, all releases, waivers and limitations expressed in this *Contract* concerning liability and remedies shall apply even in the event of the fault, tort (including negligence), strict liability, breach of contract or warranty, or other basis of liability of the party released, or whose liability is limited or against whom remedies have been limited, and shall extend to the officers, directors, partners, employees, licensors, agents, *Subcontractors* and *Affiliates* of such party.

49.4 Each of the parties hereto shall execute such further documents and give such further assurances as are required to give effect to the *Contract*.

49.5 If a court of competent jurisdiction determines that any provision of this *Contract* is invalid or unenforceable, such determination shall not affect the validity or enforceability of the remaining provisions of the *Contract*.

49.6 All of the covenants and agreements herein contained on the part of either party shall apply and enure to the benefit of and be binding upon their respective legal representatives, successors and assigns.

49.7 Each of the parties hereby represents and warrants that it has the power and authority to enter into the *Contract* and to perform all of its obligations hereunder.

49.8 The *Contract* constitutes the entire agreement between the parties with respect to the *Work* and supersedes and replaces all previous communications, representations and agreements, either written or verbal.

49.9 This *Contract* shall be governed by and construed in accordance with the laws of the Province of Ontario, and, subject to Appendix G – Dispute Resolution Procedure, the parties attorn to the jurisdiction of the Court of the Province of Ontario.

49.10 This *Contract* shall be executed by the parties, or their representatives, in person with original signatures, but may be executed in counterpart. Subsequent documents may be executed by the parties, or their representatives, and such execution may be by way of facsimile or electronic transfer.

TO EVIDENCE THEIR AGREEMENT, the parties have executed and delivered this *Contract*, by their duly authorized officers, as of the effective date indicated on the first page.

Owner:

_____

Per: _____

Name:

Per: _____

Name:

[apply corporate seal]

Contractor: **Overland Contracting Canada Inc.**

Per: [redacted]

Per: [redacted]

Name:

[apply corporate seal]

[redacted]

TO EVIDENCE THEIR AGREEMENT, the parties have executed and delivered this *Contract*, by their duly authorized officers, as of the effective date indicated on the first page.

Owner:	PUC Distribution Inc.	*Contractor:*	
Per:	[redacted]	Per:	
			Name:
Per:		Per:	
			Name:

[apply corporate seal]

Appendix AA3-7: EPC Appendix A – SSG Scope of Work

APPENDIX A – SSG SCOPE OF WORK

Article 1 - Special Instructions to Scope of Work

1.1 These *Owner* special instructions are in respect to all aspects of the Sault Smart Grid Scope Document attached as Schedule 1 to this Appendix A and will apply to all aspects of the *Work*.

Article 2 - Compliance with Ontario Regulation 22/04

2.1 All designs for equipment or designs for systems for the *Project* which shall form a part of the distribution network are required to be done to meet the requirements of Ontario Regulation 22/04, Electrical Distribution Safety under *Electricity Act, 1998* and shall include a signed declaration to state this fact. *Owner* shall provide a template for the declaration to the *Contractor* for use and reference. This declaration shall be on all provided design drawings and engineering works as a deliverable for the *Balance of the Work*.

2.2 All designs shall be sealed and signed by a professional engineer licensed in the province of Ontario.

2.3 All new physical material and equipment that is not included in *Owner* inventory, shall require *Contractor* provided manufacturer's specifications, professional engineer-approved type tests and a declaration that materials have been reviewed and approved by Owner in accordance with Ontario Regulation 22/04

2.4 A full and complete set of manufacturers' manuals, cut sheets, shop drawings, specifications and Ontario Regulation 22/04 test sheets shall be provided for all new equipment.

2.5 All construction work will be in accordance with a documented Construction Verification Plan (CVP) in accordance with Ontario Regulation 22/04 and approved by the *Owner*. Contractor will comply with Owner's existing CVP standards.

2.6 *Contractor* will provide full and final sign-off following construction including declaration of compliance with Ontario Regulation 22/04.

Article 3 - Clarification to Scope of Work and Assumptions

3.1 General Assumptions

Article 4 - COVID-19 Pandemic

4.1 Requirements for the execution of expected *Work* elements for on-site meetings and reviews may require adjustment to meet regulatory or operational restrictions due to the current COVID-19 pandemic. Both parties agree to work cooperatively in use of some level of virtual meeting environment to facilitate the project.

Article 5 - Owner's Specified Subcontractors and Materials

5.1 The Contractor will be required to engage PUC Services Inc., an *Affiliate* of the *Owner* as a *Subcontractor* for certain line construction work for the contract. The scope of this line construction work will be defined during the *Upfront Engineering Services* and approved by the *Owner* but will generally encompass the overhead line construction "make ready" work as well as some new pole installation and framing required to accommodate new equipment to be installed.

5.2 The costs incurred for this work will be invoiced to the *Owner* without mark-up applied.

5.3 The *Contractor* will be required to engage Survalent as a *Subcontractor* for the supply of certain software. The scope of this supply will be defined during the *Upfront Engineering Services* and approved by the *Owner* but is generally described in the Sault Smart Grid Scope Document.

5.4 In the above capacities, PUC Services Inc. and Survalent shall be considered *Owner's Specified Subcontractors and Materials*.

Schedule 1 – Sault Smart Grid Scope Document

See attached.

APPENDIX A, SCHEDULE 1

DRAFT

SAULT SMART GRID PROJECT

Scope Document

PREPARED FOR

PUC Sault Ste Marie

8 SEPTEMBER 2020

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LIST OF FIGURES

Project Overview

The Sault Smart Grid (SSG) Project for PUC Sault Ste. Marie (PUC) is a project to modernize its distribution energy infrastructure with new facilities at various work sites to enhance reliability, improve outage management, and reduce energy consumption through the design, procurement, installation, testing, commissioning, and training on the following set of technologies and applications[1]:

- Advanced Distribution Management System (ADMS) software that includes integrated FDIR (for both distribution and sub-transmission) and VVO applications.
- Outage Management System (OMS) software that is tightly-integrated with the new ADMS to provide outage management functions.
- SCADA-enabled line distribution equipment such as reclosers, switches, and faulted circuit indicators (FCIs) to support FDIR.
- SCADA-enabled voltage regulators and capacitors to support VVO.
- FCIs that will support FDIR on the sub-transmission system where necessary.
- Cellular communications to collect the data and provide control in support of FDIR and VVO and will be integrated into existing PUC communication networks.
- Integration with the PUC's existing Customer Information System (CIS), Advanced Metering Infrastructure (AMI), and CYME distribution model[2].

Collectively these technologies and applications comprise the SSG that is standards-based and open, positioning the PUC to deploy and/or accommodate new distributed energy resources (DERs) such as photovoltaics, energy storage (batteries), cogeneration, and electric vehicles (EVs) and support smart city and other community growth initiatives. The SSG will interface with existing PUC systems such as CIS, AMI, SCADA, CYME. The PUC will lock down by these systems to the extent deemed necessary by the PUC so as to minimize impact to the defined project tasks.

This document specifies the Project Management portion of the project, the Step 1 Engineering, Step 1 Procurement, Step 2 Engineering, Step 2 Procurement, and Step 2 Construction/Implementation phases of the project across several Project Domains, includes the design basis for the SSG, and describes the engineering services for the project. A consistent Review Procedure of engineering submissions is specified, with General Assumptions provided along with task-specific assumptions with each major task's description. Equipment description (hardware and software) is provided in a bill of material (BOM) with estimated quantities that will be finalized during the Step 1 Engineering. Major tasks are established for the required system integrations. Feeder selection for FDIR will be finalized during the Step 1 Engineering. A proof-of-concept (PoC) for the VVO and FDIR applications will be performed, such that these tasks have their engineering submissions completed before the PoC can occur. Refer to task CN1.3 Create Commissioning Plan.

This document includes the following to further define the project:

[1] The project scope of work is based upon a previously completed baseline of work established by Leidos in the "Statement of Work for Phase III – Implementation of a Utility Distribution Microgrid in Sault Ste. Marie, ON" in file "PUC SSG Statement of Work FINAL to E Co. 12142015 r1.pdf".

[2] Integration with the PUC's existing Geographic Information System (GIS) was originally planned, but based upon discussions with PUC staff and Survalent, the approach was changed so that GIS integration is no longer required.

- Physical Scoping Diagram (refer to Appendix 1 – Scoping and Logical Diagrams)
- Logical Scoping Diagram (refer to Appendix 1 – Scoping and Logical Diagrams)
- Responsibilities Matrix (refer to Appendix 2 – Responsibilities Matrix)

PROJECT DOMAINS

This document establishes the following domains:

- PUC Operational Domain
- PUC Substation Domain
- PUC Field Domain
- PUC Organizational Domain

These domains may include work in each of the following major tasks:

- Step 1 Engineering
- Step 1 Procurement
- Step 2 Engineering
- Step 2 Procurement
- Step 2 Construction/Implementation

REVIEW PROCEDURE

All project tasks include a list or table of engineering submissions, or deliverables, that lists the deliverables as requiring preliminary design and final design review, where the review cycles are shown in Table 1.

In general, during the review process the comments from a previous submittal will be incorporated into the next submittal. For example:

- The preliminary design review comments will be incorporated into the final design deliverables; and the final design review comments incorporated into the IFC.
- Some deliverable material may only have one design review and could be provided in additional design review packages for reference. Refer to the deliverables section within each major task for specific information on the planned deliverable reviews.
- Where the PUC is responsible for the deliverable as indicated in the responsibility matrix, the deliverable will be provided to Contractor and follow the same deliverable schedule as shown in Table 1.
- Contractor will initiate final acceptance of deliverables after confirming all PUC comments and any punch list items are addressed (refer to Table 1).

The following are examples of as-builts (as appropriate to the deliverable description):

- Completed testing plans with all punch list items completed
- Final files (such as configurations)
- System backups
- Conformed to construction drawings reflecting any drawing markups received from the field
- Training logs

Table 1 Review and Comment Timeline of Engineering Submissions in Business Days

NO.	DELIVERABLE OR ENGINEERING SUBMISSION	PUC REVIEW	CONTRACTOR UPDATES	FINAL ACCEPTANCE
1.	Preliminary and final documents for Step1 Engineering or Step 2 Engineering as identified in each deliverable section	10	5	5
2.	Testing plan templates			
3.	Training plans, materials, and logs			
4.	Maintenance plans			
5.	Reports			
6.	Cut-over plan			
7.	Completed testing plans (i.e., testing as outlined in the plan is completed and all punch list items resolved)	5	3	3
8.	Materials for neighborhood or community meetings			
9.	As-builts	10	5	5
10.	Turnover package			
11.	Completed cut-over plan			
12.	Meeting Minutes (refer to Table 3)	3	2	1
13.	Monthly schedules (refer to Table 3)			
14.	Project Execution Plan (refer to Table 3)			
15.	Commissioning Plan	10	5	5

GENERAL ASSUMPTIONS

The following general assumptions apply to the SSG Project:

1. Four-week notice will be provided of any change in the scheduled dates for any project team members to be on site.
2. All reports will be provided using Microsoft Word docx format.

3. All testing plans will be provided using Microsoft Excel xlsx format.
4. All data flow diagrams will be provided using Microsoft Visio vsdx format.
5. All engineering design drawings and work order drawings will be provided using AutoCAD.
6. This document includes four, one week long, on-site meetings (or virtual meetings due to COVID-19) with the project manager and discipline leads (including the project kickoff meeting, leaving three during project execution).
7. The PUC will provide reasonable access to the PUC's managerial, business, field, operations, IT resources, administrative, technical, and other stakeholder resources to support the project and its reliance and connectivity on the PUC's existing systems as described in this document (e.g., IT/networks, SCADA, operations, construction, communications). The PUC staff will support in a timely manner at least the following: all requests for information, data, and files; phone discussions; meetings; deliverable reviews; and conference calls so that the project schedule and budget may be maintained.
8. The PUC will provide appropriate training and badging to members of the team when they are working on-site for an extended time for the purpose of easy access to PUC-managed buildings and other locations without the need for daily temporary badging and/or escorts.
9. The PUC will provide the following while team members are on site executing tasks associated with this document, including: adequate working space, including conference rooms, internet access, resources (including data, software, utility tools and software, and associated maintenance, if specified and approved by PUC), parking, telephone equipment and services, facsimile machines, utilities and office-related equipment, and supplies reasonably required.
10. The PUC has adequate communication network monitoring capabilities that will be configured by the PUC to monitor the new communications equipment using SNMPv3.
11. The PUC will provide copies of policies and procedures related to this document and notice of any modifications and amendments in a timely manner so as not to adversely impact project scope, schedule, or budget.
12. As-builts for markups of issued for construction (IFC) drawings completed in the field will be updated in the GIS by the PUC.
13. Contractor does not warrant or guarantee the existing equipment or subsystems but will add to these systems to create the SSG.
14. Contractor will design, install, test, and commission the integration to existing systems but does not warrant or guarantee the performance of existing systems.
15. The CYME model will be provided by the PUC and is a valid, functional, and working model.
16. All workshops will be held over contiguous days, if onsite.

Project Management

The project management domain will provide project management, oversight, and reporting to monitor and manage the SSG Project collaboratively with the PUC. This task will track status, scope, and schedule in accordance with the agreed-to objectives for safety, quality, scope, budget, and schedule.

PM1 PROJECT KICKOFF MEETING

This task will plan and conduct a project kickoff meeting on-site with the PUC's internal program leadership including other stakeholders as appropriate. All design leads will attend the project kickoff meeting and subsequent workshops related to the project's scope. Contractor will develop an agenda for the project kickoff meetings and provide follow-up meeting notes including issues, decisions, and action items.

PM1.1 Organizational Structure

This task will introduce the project manager assigned to the project and the project's high-level organizational structure, focusing on senior leadership and establishing the Project Steering Committee members (refer to task PM3 Project Steering Committee Meetings).

PM1.2 Staffing and Resources

This task will review the staffing model covering all aspects of the defined project. This task will also review the PUC's staffing and resources to match them with the tasks outlined in the responsibility matrix and this document.

PM1.3 Stakeholders

This task will identify all PUC stakeholders and their relationships to the project. The protocol of communication to each from the project team members is addressed in task PM1.7 Communications Plan.

PM1.4 Reporting Methodology

This task will discuss the planned project reporting associated with project controls tasks PM5 Overall Schedule, Phases, and Milestones and PM7 Budget Planning & Forecasting. This task will also cover risk and opportunity matrix (refer to task PM6 Risk Management).

PM1.5 Schedule

This task will review the planned project schedule. Of critical importance to discuss is the PoC for VVO and FDIR and how it will be represented in the schedule. Note that continuing schedule management is addressed in task PM5 Overall Schedule, Phases, and Milestones.

PM1.6 Scope and Change Management

This task will review the planned project scope as contained within this document. This task will also review the planned overall change management process that will be formalized in task PM4 Change Management.

PM1.7 Communications Plan

This task will review the planned format for communications between project team members and establish the basis of the communications plan deliverable for this task (refer to Table 3).

The communication plan will address items such as:

- Transmittal of large electronic files between project parties
- Standard templates for typical types of communications between project parties
- Email subject line standardization
- Documentation of phone conversations and other exchanges between team members if it has an official or significant status
- Conference and meeting memorandums

The communications plan will also review the planned document management process deliverable for this task (refer to Table 3). The document control process defines how to handle items such as:

- Incoming project hard copy document received by project personnel
- Incoming project electronic copy document or email communication received directly by project personnel
- Outgoing documents created by project personnel requiring review (typically deliverables)

In addition, the document control process defines items such as:

- Document (record) retention
- Classification of records (such as confidential information and proprietary information)
- Storage method(s)
- Retention times

PM2 MANAGEMENT STATUS MEETINGS

This task will plan and conduct a bi-weekly meeting with the PUC's internal project leadership including other stakeholders and design leads as appropriate. Management status meetings will start after the project kickoff and end before project completion. Contractor will develop an agenda for the meetings and provide follow-up meeting minutes including issue management, decisions, action items, and review of the risk register developed from task PM6 Risk Management.

PM3 PROJECT STEERING COMMITTEE MEETINGS

This task will plan and conduct a project steering committee on a monthly basis (refer to task PM1.1 Organizational Structure for determining who will attend these meetings). Contractor will utilize documentation from project reporting to support the PUC and collaborate with project leadership as needed to prepare and present project status. Contractor will develop an agenda for the meetings and provide follow-up meeting minutes.

Project design leads along with their corresponding resources and stakeholders at the PUC are not expected to attend this meeting.

Executive status meetings will start after the project kickoff and end before project completion.

PM4 CHANGE MANAGEMENT

Change management focuses on scope changes identified by any project team member that impact project budget and/or schedule. This task will monitor, report, and manage these changes. At any time during the project, team members will monitor potential deviations to scope (tasks and/or deliverables contained within this document) for possible impacts to project schedule and budget and report them to the project management team for tracking under this task as a contemplated change notice.

Once a contemplated change is identified by the project team, this process will identify and track them using an internal change notification form. Upon review of the project manager, a formal contemplated change notice and change quotation will be issued to the PUC. Upon review, the PUC may issue a signed change order. After receipt, this document will be updated to reflect the appropriate change in project scope, schedule, or budget before being executed by the project team.

In the case where the change is initiated by the PUC, the change directive must be in writing.

PM5 OVERALL SCHEDULE, PHASES, AND MILESTONES

This task will create and manage the overall project schedule (not resource loaded), showing progress on project milestones and milestone dates. Developing and maintaining the project schedule is a vital component of executing a successful project. Effectively incorporating the schedule commitments of the internal and external stakeholders across the SSG project is a primary challenge of any utility project.

This task will also take as input from task PM1.5 Schedule on how the PoC for VVO and FDIR will be addressed in the schedule.

PM5.1 Overall Project Schedule

This task will create and maintain the overall project schedule at a high level, highlighting key milestones and milestone dates in a three-week look ahead.

PM5.2 Engineering Schedule

This task will create and maintain the engineering schedule for the engineering tasks as defined in this document. Project milestones and milestone dates are identified.

PM5.3 Procurement Schedule

This task will create and maintain the procurement schedule for the procurement tasks as defined in this document. Also refer to task PR1 Major Materials and Equipment. Project milestones and milestone dates are identified.

PM5.4 Construction Schedule

This task will create and maintain the construction schedule for the construction work tasks as defined in this document. Project milestones and milestone dates are identified.

PM5.5 Schedule Consolidation

Based on the engineering and construction schedules, this task will create and maintain a consolidated schedule.

PM5.6 Execution Logistics: Scheduling Access, Safety Escorts, Training

Coordination of logistics with the PUC to provide escorts where required will be key to maintaining schedule efficiency. All required escorts, training, etc. are anticipated to be provided by the PUC. This task will coordinate and manage these requirements on the program with the PUC's stakeholders and the project team.

PM6 RISK MANAGEMENT

Contract terms, weather, accidents, suppliers, subcontractors, socioeconomic issues, technology, scope definition, and estimates all introduce elements of risk. Project risk cannot be eliminated but it can be controlled and mitigated. Through the process of identifying and documenting, risk exposure is controlled on projects. This task will assist the PUC in identifying and addressing strategies to optimally manage and mitigate risks and manage opportunities on the project.

This task will create the risk management process as well as manage the risk and opportunity register, a project deliverable (refer to Table 3) that documents specific risks and opportunities of the project and associated strategies to mitigate risk or to leverage the opportunity.

This task will only address project risks due to external influences. Risks due to internal project factors will be internally addressed by the project manager.

The risk and opportunity register will include several items, such as:

- Identifier (ID), which will uniquely identify the risk or opportunity
- Title, which will be a shortened version of the description
- Description, which will contain a complete description of the risk or opportunity
- Impact, which will indicate the impact to the project in terms of budget, time, quality, etc.
- Probability, which will indicate the probability of occurrence
- Severity, which will indicate whether the risk is critical, high, medium or low
- Rating, which will be a simple product of the probability and severity
- Type, which will indicate the type of risk, such as technical (design), construction, safety, organizational, and procurement
- Plan, which for risks will describe the mitigation plan and for opportunities will describe how the opportunity will be implemented
- Contingency, which will describe whether there is any alternate approach or compensating measure that could be used if the risk is not mitigated or the opportunity not pursued
- Status, which will indicate whether the risk or opportunity is open or closed
- Owner, which will indicate who is responsible for the risk or opportunity

PM7 BUDGET PLANNING & FORECASTING

This task for project controls will monitor the project budget and update the project schedule.

PM8 QUALITY ASSURANCE

This task performs quality assurance (QA) work throughout all project execution activities as applicable to Telecom's Quality Management System (QMS) and supporting QMS documents (Contractor Telecommunications has ISO-9001:2015 certification). This document has several deliverable tables showing what deliverables are provided to the PUC for review and at what stage (preliminary and final).

As part of this task, the Contractor Project Manager designates the lead discipline engineers responsible for documenting that the applicable codes, procedures, guides, and design requirements (as specified as part of the design basis included throughout this document) have been read and applied by project staff under their direction when executing their portion of the project work.

Our internal quality management plan will not be provided in whole to the PUC; however, what our QMS calls a "Project Quality Plan" will be provided as the deliverable from this task shown in Table 3.

PM9 PROJECT EXECUTION PLAN (PEP)

This task will create and maintain the PEP, a standard document required by our Execution Excellence that provides guidance regarding project activities from project initiation, through execution, and final

closeout and serves as a roadmap for the consistent execution of the SSG. The PEP defines the scope and requirements for the project from start to finish, including the following items related to internal project execution:

- Project initiation, consisting of several activities that occur at the start of the project. These activities include the kickoff meeting, development of the PEP, and discipline assignments needed to delineate the execution plan.
- Scope Management, including division of work (work breakdown structure), deliverables list, and interface coordination.
- Resource Management, including project staffing plan, project collocation plan, construction representation, field staff policies, training requirements, and IT requirements.
- Quality Management or Execution Excellence, including a quality plan and project quality support.
- Environmental, Safety, Health, and Security (ESH&S) Management, including ESH&S performance metrics/goals, client requirements, site/local/state requirements, staffing and support, prequalification/requalification of vendors/suppliers, program management, reporting, training, hazardous waste/material management, security support/services, and other ESH&S items of concern (i.e., a safety plan).
- Commercial management.
- Project controls management.
- Project Health evaluation.
- Engineering management.
- Procurement management.
- Construction management.
- Commissioning management.
- Risk and opportunity management.

The relationship of this document to the Contractor PEP is shown in Table 2.

Table 2 PEP Cross Reference

PEP SECTION	PEP SECTION TITLE	DOCUMENT SECTIONS
2.1.1	Work Breakdown Structure (WBS)[3]	The table of contents provides the coding structure and task name from a majority of the headings that will be used for the WBS and the responsibility matrix. Support for each task is delineated in the responsibility matrix.
2.2	Deliverables List	PM Deliverables

[3] A project WBS divides the project scope into discrete manageable work packages that focus on the deliverables included in the project scope of work. The WBS has a coding structure that is logical and the permits tracking of progress, costs, work hours, and schedule. The level of detail is adequate to support effective project execution and collection of historical data.

PEP SECTION	PEP SECTION TITLE	DOCUMENT SECTIONS
Attachment 16.4	Project Deliverables	VO1 Deliverables VO2 Deliverables VO3 Deliverables VO4 Deliverables VO5 Deliverables VO6 Deliverables VO7 Deliverables VO8 Deliverables VO9 Deliverables VO10 Deliverables VO11 Deliverables VO12 Deliverables VF1 Deliverables VF2 Deliverables VF3 Deliverables VF4 Deliverables VF5 Deliverables VB1 Deliverables VP1 Deliverables VP2 Deliverables EA1 Deliverables EA2 Deliverables EA3 Deliverables EA4 Deliverables EA5 Deliverables EA6 Deliverables EA7 Deliverables EF1 Deliverables EF2 Deliverables EF3 Deliverables EO1 Deliverables EO2 Deliverables PR1 Deliverables PR2 Deliverables PR3 Deliverables PR4 Deliverables ST1 Deliverables ST2 Deliverables CN1 Deliverables CO1 Deliverables CO2 Deliverables CO3 Deliverables CO4 Deliverables CO5 Deliverables CF1 Deliverables
9.1	Design Basis Document	Throughout this document
9.4	Engineering Reviews	Review Procedure

PEP SECTION	PEP SECTION TITLE	DOCUMENT SECTIONS
10.6	Purchasing and Logistics	VP1 Quote Major Materials and Equipment PR1 Major Materials and Equipment PR2 Purchase All Other Materials and Equipment
10.9	Material Management	PR3 Establish and Manage Inventory and Warehouse There are no specific assumptions for this task. Refer to General Assumptions. PR4 Inspect and Verify OEM Specs
11	Construction Management	CN1 Construction Activities and Management
12	Commissioning Management	CN1.3 Create Commissioning Plan CN1.5 Manage Commissioning
2.2.1	Site List	EF1 Detailed Design for Field Equipment
Attachment 16.3	Project Site List	
Attachment 16.6	Bill of Quantities/Basis of Estimate	Table 13 Conceptual Major Electrical Equipment and Field Devices Bill of Material

PM DELIVERABLES

Deliverables provided by the task Project Management are listed in Table 3.

Table 3 Task PM Deliverable List

DELIVERABLE DESCRIPTION	TASK	DRAFT / FINAL	SCHEDULED UPDATES	UPDATES AS NEEDED
1. PEP	PM9 Project Execution Plan (PEP)	■		■
2. This document	Updated via PM4 Change Management			■
3. Meeting minutes	PM1 Project Kickoff Meeting PM2 Management Status Meetings PM3 Project Steering Committee Meetings	■		

PM REVIEWS

The review schedule for project management deliverables as shown in Table 3 is different than all other provided design-related deliverables (refer to Table 1), without a formal 30-60-90 percent design review process with the following clarifications:

- Submittals with a draft are submitted and finalized per the assumptions stated in PM Assumptions or other notes in this table.
- Submittals with regularly scheduled updates are reviewed and finalized per the assumptions stated in PM Assumptions.
- Deliverables are updated as needed when changes are identified through the change management process. The same review cycles for revisions will be followed as for the original draft.

Refer to the PM Assumptions regarding review cycles.

PM ASSUMPTIONS

1. The deliverables shown in Table 3 have reviews completed as shown in Table 1.
2. Schedule updates will be submitted for review on a monthly basis. Reviews are then completed on these deliverables as shown in in Table 1.
3. Updates to deliverables shown in Table 3 are expected no more frequent than on a quarterly basis.
4. Task PM7 Budget Planning & Forecasting is an internal project control task.

Step 1 Engineering

The Step 1 Engineering phase will perform enough design so that firm fixed pricing can be developed for Step 2 Engineering, Step 2 Procurement, Step 2 Construction/Implementation major tasks. All Step 1 Engineering major tasks start with the letter "V" for value-based. This includes engineering and procurement tasks across the PUC Operational Domain, PUC Field Domain, and PUC Organizational Domain. This will evaluate the performance of 48 distribution feeders, how they could be improved with FDIR, the expected improvements, and estimating the VVO savings for each distribution feeder (using a similar methodology as reported by Leidos). The goal is to determine the extent of FDIR equipment deployment across the distribution feeders in comparison to the estimated VVO energy savings.

Step 1 Engineering will start with the project kickoff meeting (refer to task PM1 Project Kickoff Meeting). Step 1 Engineering includes several tasks that are completed in the following order:

1. VO1 Update CYME Model
2. VF1 Calculate Feeder and 34.5kV Performance (CMI)
3. VF2 Field Engineering
4. VF3 Future Reliability and Energy Savings Performance
5. VF4 Select Feeders (12/24/36/48)

Other tasks during Step 1 Engineering will occur in parallel with the previous tasks:

1. VO2 Survalent Reporting
2. VO3 Evaluate CIS Integration
3. VO4 Evaluate SCADA Data
4. VO5 Evaluate ADMS and VVO Options

5. VO6 Identify the Virtual Server Requirements
6. VB1 Organizational Change

Some procurement activities will also take place during the Step 1 Engineering to support the cost estimating process.

ENGINEERING

PUC Operational Domain

The PUC operational domain includes CYME, ADMS, OMS, CIS, SCADA, and VIR. The ADMS applications VVO and FDIR will require field data supplied by the Survalent SCADA master from each of the intelligent electronic devices (IEDs) (such as FCI, regulator controller, and switch controller) supporting the field equipment listed in the headers in Table 12 and further detailed in Table 13 ("field devices") to support the ADMS applications. DNP3 (IEEE 1815) will be used for communications to all field devices, using cellular communications. The VVO and FDIR applications require a feeder connectivity model that is maintained and up-to-date (refer to task VO1 Update CYME Model).

The FDIR algorithm provided by Survalent will analyze the pattern of fault targets received from the field by the SCADA system. When a breaker lockout is detected:

1. FDIR analyzes the pattern of fault targets received by the SCADA master to determine the fault location.
2. FDIR opens a new blank switch order record.
3. If the fault is between the breaker and the first level of closed switches, FDIR adds commands to the switch order to open the first level of closed switches. The breaker is left open to isolate the faulted section.
4. If the fault is downstream of the first level of closed switches, FDIR isolates the fault by adding commands to open all closed switches around the faulted area. FDIR then adds a command to close the breaker. This restores service above the fault.
5. FDIR then analyzes the area beyond each opened switch to see if the area downstream can be transferred to another feeder.

The centralized VVO algorithm provided by Survalent will coordinate control of reactive power (via capacitor banks) and voltage (via regulators). VVO will require load flow and will optimize the following user-selectable objective functions subject to user-configurable constraints:

- Loss Minimization: This objective minimizes total losses (transformer losses at the substation and line losses along the feeders).
- Energy Conservation: This objective reduces load by minimizing voltage throughout the network without violating constraints.
- Revenue Maximization: This objective maximizes the difference between energy sales (price of energy delivered to customers) and cost (cost of production or purchase). Voltage is raised until increased losses start to outweigh increased sales. Where this point falls depends on the actual mix of load types (constant current, constant impedance and constant power).

The load flow application will periodically run a three-phase unbalanced load flow:

- Automatically at on a user-defined periodic interval

- Whenever there is a significant change in the substation data (voltage, load) in the SCADA system database, where the definition of "significant" is user-defined
- After a feeder reconfiguration has occurred (by switching action) or after the dispatcher has made some changes in the line sections database via the Line Section Editor

The load flow application will:

- Redistribute the feeder load data so that the total matches the substation data in the SCADA system
- Update the feeder voltage/loss profiles
- Update the feeder min/max margin and min/max volts data
- Provides the calculation results in reports; however, for many of the calculated data items, the Line Section Editor allows the user to specify database points to receive them, for easy viewing directly on the map. Some of the calculated data items that can be mapped to SCADA database points are:
  - Three-phase voltages and currents at a line section
  - The magnitude of the minimum current margin between the line section and the substation
  - The magnitudes of the minimum and maximum voltages between the line section and the end of the feeder

The VVO application will provide VVO performance metrics as described in task VO2.3 Evaluate VVO Reporting.

VO1 Update CYME Model

This task will be coordinated with the output of task VO9.1 Plan and Conduct CYME Integration Workshop to update the CYME model because all subsequent Step 1 Engineering tasks rely on an accurate system model. To accomplish the update, this task will:

- Compare the CYME model to GIS data (that is known to be upwards of a year behind), existing SCADA master schematics, not-yet processed work orders that are field complete, and other relevant information.
- Map the CYME database tables to Survalent's required import table format.
- Test-import the CYME import table into the ADMS to determine any basic errors, where a remediation plan will be created to fix the CYME model. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO1 Deliverables

1. Evaluation of CYME remediation options with impact to project scope, schedule, or budget.
2. Validated CYME model.

VO1 Reviews

The deliverables for task VO1 Update CYME Model will be issued with one review.

VO1 Assumptions

1. The PUC will provide access to the GIS and other systems required to perform the tasks in order to meet project scope, schedule, or budget.

2. The PUC will incorporate the sub-transmission system model into the distribution model in CYME and that file exported for use on the SSG project that meets the project schedule.

VO2 Survalent Reporting

This task will review the performance monitoring objectives and requirements along with Survalent capabilities, and collect stakeholder input and data around KPIs associated with FDIR and VVO applications and determine what reporting functionality will meet the Ontario Energy Board (OEB) and Natural Resources Canada (NRCan) requirements related to VVO performance (e.g., estimated and actual energy savings) and FDIR performance (e.g., changes in reliability indices). FDIR and VVO data summarization and analysis will be supported by the OMS through the OMS reporting functionality, the provided internal stakeholder dashboard, and the Key Performance Indicator (KPI) editor.

VO2.1 Evaluate ADMS Reporting

This task will review the FDIR data summarization and analysis found in the OMS reporting through four types of standard reports:

1. Outage Case Report. A multi-line report that shows all of the details of the cases selected based upon filtered criteria (serial number, case description, case status, start time, cause, number of calls, priority, customer minutes, type, lost kVA, count of customers affected, phase, restoration time, duration, work status, etc.). This report type can be used to review the complete details of a set of outages based upon the specified selection criteria. Outage cases are displayed in ascending order of case number.
2. Outage Summary Report. This report shows the summary information for the cases selected based upon filtered criteria.
3. Reliability Index Report. This report shows monthly reliability index information based upon filtered criteria, such as a certain reliability index being within a range of values.
4. Quality of Service Report. This report allows the comparison of feeders based upon selected metrics (e.g., customer minutes, number of outages, reliability indices, KVA minutes), presenting the results both numerically and with a subjective label (e.g., good, fair, poor).

Other functionality that will be investigated include:

1. FDIR performance metric and penalty calculation. Survalent's roadmap includes a FLISR dashboard in SmartVu that will provide a summary of all FLISR events in the system. Users would be able to filter/sort this display (including by restoration time) and would have the option to export the dashboard contents to PDF. This should support the confirmation whether the ADMS can report a list of outages where fault restoration (to un-faulted segments) was not achieved within 1 minute[4] of fault inception, whether in automatic mode or semi-automatic mode.
2. Data summarization and analysis that gathers and analyzes outage event data and archives summarized data in a meaningful format to enable trending of outage data statistics and is accessible by approved stakeholders.

[4] "Electricity Reporting & Record Keeping Requirements", section 2.1.4.2, dated May 3, 2016, from the Ontario Electric Board, states:

> *An "Interruption" means the loss of electrical power, being a complete loss of voltage, of a duration of one minute or more, to one or more customers, including planned interruptions scheduled by the distributor but excluding part power situations, outages scheduled by a customer, interruptions by order of emergency services, disconnections for non-payment or power quality issues such as sags, swells, impulses or harmonics.*

3. Data verification and validation.[5]

VO2.2 Evaluate OMS Reporting

This task will review the OMS reporting that can be:

- Customized by user/workstation
- Saved to a folder location for future retrieval

This task will review the internal stakeholder dashboard that will allow approved PUC's internal stakeholders to:

- View locations and the extent of existing outage cases
- View outage ticket information such as cause, estimated time of restoration, and outage messages
- View a list of all planned outages

In addition, the internal stakeholder dashboard:

1. Integrates real-time outage information including location, and customer information for each outage case
2. Presents a customizable layout for KPIs, customers impacted, outage location, reliability indices
3. Provides configurable map layers: connectivity model, meters/transformers, outages, jobs, vehicles
4. Allows for outage cases to be updated remotely, including the estimated time of restoration and 'Message to Public', for display in the Customer Outage Portal.

The KPI editor provides two functions: displaying the KPI values as calculated by the OMS and allowing the KPIs to be mapped to analog values. The KPIs are organized into the following categories:

1. Customers
    a. Total customers
    b. Customers out, unplanned
    c. Customers out, planned
    d. Customers out, total
    e. Customers restored, total
    f. Hi-priority customers out
    g. Total smart meters
    h. Total power-on smart meters
    i. Total power-off smart meters
2. Outages
    a. Feeders with outages
    b. Transformers out
    c. Total lost KVA
    d. Active outages
    e. Today's sustained outages
    f. Yesterday's sustained outages

[5] The Leidos statement of work does not provide definition around the term "data verification and validation". Given the "SCADA data" requested in Appendix II of the Leidos statement of work, this could be the verification and validation of received values against average values for per-phase amps and volts; and 3-phase apparent power, real power, and reactive power.

g. This month's sustained outages
h. Last month's sustained outages
i. Today's momentary outages
j. Yesterday's momentary outages
k. This month's momentary outages
l. Last month's momentary outages

3. Calls
   m. Outage calls this hour
   n. Outage calls last hour
   o. Outage calls today
   p. Outage calls yesterday
   q. Unhandled emergency calls
   r. Dispatched emergency calls
   s. Outage portal accesses this hour
   t. Outage portal accesses last hour
   u. Outage portal accesses today
   v. Outage portal accesses yesterday
   w. On-duty customer service representatives (CSRs)
   x. Number of manual outage calls in the last 60 minutes
   y. Number of IVR outage calls in the last 60 minutes
   z. Number of TCS outage calls in the last 60 minutes
   aa. Number of WEB outage calls in the last 60 minutes
   bb. Number of CSR outage calls in the last 60 minutes
4. Response
   cc. Assigned crews
   dd. % Acceptable outage response current month
   ee. % Acceptable emergency response current month
   ff. % Acceptable outage response previous month
   gg. % Acceptable emergency response previous month
5. Reliability
   hh. Yesterday's SAIDI
   ii. Yesterday's CAIDI
   jj. This month's SAIDI
   kk. This month's CAIDI
   ll. Last month's SAIDI
   mm. Last month's CAIDI
   nn. Yesterday's SAIFI
   oo. Yesterday's CAIFI
   pp. This month's SAIFI
   qq. This month's CAIFI
   rr. Last month's SAIFI
   ss. Last month's CAIFI

This task will review and document any additional interface requirements, the configuration of default options, and user access control for the OMS.

VO2.3 Evaluate VVO Reporting

VVO reporting is supported by logging. The VVO application will provide VVO performance metrics when the VVO application generates a log of its calculations and decision-making process. The log is created for each hour's operation that:

- Is viewable as a softcopy or printed report.
- Includes the value of the objective function at each substation, both before and after optimization, providing an estimate of the calculated benefit of each VVO operation.
- Contains a list of the controls that were executed (if in automatic mode) or controls that VVO recommended to be executed (if in semi-automatic mode).
- Summarizes VVO performance metrics on a daily basis for an average of daily end-of-line meter average voltage data (i.e., an average of averages), flagging violations if the daily average voltage readings are outside of a pre-determined voltage band (e.g., 110-115V).

VO2 Deliverables

1. Evaluation of OEB and NRCan reporting requirements compared to Survalent functionality provided in the ADMS, OMS, and VVO, including an assessment of impact to project scope, schedule, or budget.

VO2 Reviews

The deliverables for task VO2 Survalent Reporting will be issued with one final review.

VO2 Assumptions

1. The PUC will provide experienced resources who can provide input on OEB and NRCan reporting requirements.

VO3 Evaluate CIS Integration

This task will evaluate the CIS integration via a CIS import table. The PUC recently completed a contract with Harris Norhtstar to upgrade to CIS 6.4 with CustomerConnect, but is not using the HomeConnect and SiteConnect components of CustomerConnect.

VO3.1 CIS Integration Workshop

This task will plan and conduct a CIS integration workshop to:

1. Develop the use cases for the interface.
2. Develop the integration requirements for the CIS system so that the integration provides the required data.

This task will plan and conduct a CIS integration workshop after the project kickoff meeting (refer to task PM1 Project Kickoff Meeting). The CIS integration workshop will review the import table requirements. The workshop will address:

1. Conceptual integration, including conceptual use cases, file requirements, third party, training, testing, and maintenance requirements.
2. Documents the CIS-OMS flat file requirements by investigating answers to questions such as:
    a. What are the use cases for the interface?
    b. How do the existing workflows impact interface triggers?

   c. What information is required and in what format? Does an existing relationship exist between the meter and the transformer?
   d. Are any data transformations required?
   e. What data is missing from the CIS system that the OMS requires?
   f. How should the OMS respond/behave?
   g. What priority is the integration (especially if a manual file transfer)?
   h. How are errors handled and reported?
3. Data cleansing and maintenance of existing systems/applications to ensure the data accessed within PUC systems is complete and correct before testing
4. Training of PUC staff on operations and maintenance so the PUC has the resource(s) to assume operational responsibility.
5. Integration testing
   a. User Acceptance Testing on integration
   b. User Acceptance sign off
6. Operational transition to PUC personnel.
7. Identify work Harris NorthStar needs to perform and conceptual tasks and milestones that will be added to the schedule for monitoring as part of normal project management activities (refer to task PM5 Overall Schedule, Phases, and Milestones). Contractual options and impacts will also be identified (e.g., whether the PUC has authorized Contractor to work with Harris NorthStar directly or the PUC will be contracting directly with Harris NorthStar).
8. The documentation, testing, commissioning, maintenance, and training requirements.
9. Identify any potential organizational and/or process changes for input into tasks VB1 Organizational Change .

VO3.2 CIS Report

Upon completion of task VO3.1 CIS Integration Workshop, this task will prepare a CIS integration report that:

1. Documents the CIS-OMS flat file requirements, including whether the CIS flat file interface is Survalent's standard interface, and use cases.
2. Evaluates whether Harris NorthStar scope and estimate of work are required.
3. Provides the conceptual testing plan.
4. Provides the conceptual maintenance plan.
5. Identifies any conceptual organizational and/or process changes for input into tasks VB1 Organizational Change .
6. Assesses impacts to project scope, schedule, and budget.

After the required reviews are complete, PUC will select the CIS integration method. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO3 Deliverables

Deliverables provided by task VO3 Evaluate CIS Integration are listed in Table 4.

Table 4 Task VO3 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB[6]
1. CIS toolset assessment report.	VO3.2 CIS Report		■	■	

[6] AB is an acronym for as-built, final as-left files, or equivalent.

VO3 Reviews

Refer to Review Procedure.

VO3 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

VO4 Evaluate SCADA Data

This task will confirm the adequacy of the existing substation SCADA implementations (for the applicable substations listed in Table 12) in that the available data meets or exceeds the data requirements for the FDIR and VVO applications:

- Whether all required ADMS points from the field devices (refer to Table 13) and substation protection relays (some GE 760, but many SEL-351S similar to part number 0351S5XHD4F5422) are available as standard points.
- Whether DNP3 Level 2 communications will sufficiently support the ADMS application requirements.
- Whether the PUC has an acceptable standard point list format (as determined by Contractor) or Contractor's standard point list template (as determined by the PUC) will be acceptable to use to support the field devices and task EA3.3.1 Define Device Template Point Lists.

If the existing SCADA points are insufficient in supporting the applications, the report will recommend the correction with an estimate of any additional integration work, new substation equipment, programming, or other required work. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO4 Deliverables

Deliverables provided by task VO4 Evaluate SCADA Data are listed in Table 5.

Table 5 Task VO4 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Report for the number of substations listed in Table 12 evaluating the existing SCADA implementation against the data requirements.	VO4 Evaluate SCADA Data		■	■	

VO4 Reviews

Refer to Review Procedure.

VO4 Assumptions

1. The PUC will supply each substation's existing RTU point list.
2. The PUC will supply the substation RTU configuration file if requested to support this work.

VO5 Evaluate ADMS and VVO Options

This task will evaluate the included items and optional items the PUC wants to implement for the SSG Project as shown in Table 6. In addition, this task will also confirm whether a software upgrade from the currently installed version will be required to support the baseline proposal software or any selected options. This task will also review what software the baseline or selected options can leverage from existing software already in use at the PUC. For example, if the PUC has an existing license for MS SQL server that can be used for SCADA Replicator and Archiver. Finally, this task will also review the standard graphics and symbols available from the Survalent ADMS to determine if any symbol development work is required for the SSG.

Table 6 ADMS and VVO Options Cross Reference

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
Advanced SCADA Historian	SCADA	The standard SCADA historian provides a historical data collection facility that allows the user to define the points that are to be sampled, the sample frequency and how long to retain the sample data. The Advanced SCADA historian provides continuous data collection for any analogue or status value upon detection of its value change or quality code change. The Advanced SCADA Historian uses a proprietary, real-time database for optimal performance and supports an ODBC interface for integration with Microsoft Access, Microsoft Excel, and other third-party applications and report packages.	Yes
Automatic Generation Control	Generation Management	Automatic Generation Control (AGC) is a feedback control system that regulates the power output of electric generators to maintain a specified system frequency and/or scheduled interchange.	No
Automatic Vehicle Location (AVL) Interface	SCADA	Automatic Vehicle Location (AVL) displays the location of utility fleet vehicles (or other mobile assets in your organization) on the SCADA displays.	No
Call Handler Interface	OMS	This web-based interface provides Customer Service Representatives (CSR) and other staff to record customer trouble calls and make the data immediately available to the Survalent OMS for analysis, dispatch and resolution.	Yes

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
Customer and Stakeholder Email Notification	OMS	This application allows PUC to email customizable outage information to customers and stakeholders, both "internal" (e.g. managers, engineers, communications department) and "external" (e.g. mayor, city councilors, media, police), to keep them informed throughout an outage.	No
Customer Outage Portal	OMS	This portal allows PUC customers to view the location of existing outages, and send new outage information, through the Customer Outage Portal.	Yes
Damage Reports License	OMS	This license supports the damage reporting and assessment application that allows field crews to capture and accurately record equipment damage associated to a specific outage, trouble call, group of calls, or at a location where there is no predicted outage. It also has an Inspection Tours feature that enables authorized users to define routes to inspect various locations for damage assessment, fault location, asset management, etc.	No
Data Forwarding	SCADA	This application provides a means for the external support systems (PDS, QAS, OTS, etc.) to receive near-real-time data from the active control system. The data is retrieved from data sources by the active control system and sent on to the external systems (data forwarding). Data forwarded to the external systems includes all telemetered data, manually entered data, tags, limit overrides, etc.	Yes
Distribution Contingency Analysis (DCA)	ADMS	The Distribution Contingency Analysis (DCA) application allows System Operators to be better prepared by informing them if there is a contingency plan available for the critical areas of their network.	Yes
Dynamic Voltage Regulation	ADMS	Dynamic Voltage Regulation (DVR) application reduces peak demand and manages optimal feeder voltage limits.	Yes
Economic Dispatch	Generation Management	The Economic Dispatch application dispatches the system generation required to supply a given load in a manner that minimizes the cost of production.	No
External Alarm Bell	SCADA	External Alarm Bell drives external alarm devices and is typically used when operating under noisy conditions or to alert personnel outside the building.	No

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
External Clock Interface	SCADA	All of the SCADA servers and workstations synchronize their local time to a time reference using the Network Time Protocol (NTP) in the base system. The External Clock Interface allows the SCADA master to synchronize its computer time to that of an external (GPS) clock.	No
Fault Data Recorder	SCADA	This application provides the ability to upload and record fault data from Schweitzer Engineering Laboratories (SEL) relays.	No
Fault Location, Isolation, and Service Restoration (FLISR)	ADMS	The FLISR application helps minimize the downtime caused by outages that trip and lock out devices in a distribution network.	Yes
GIS Wizard	OMS	The GIS Wizard is used to import the distribution network model and geographic displays into the ADMS from a GIS.	Yes
IED Control Panel	ADMS	IED Control Panel is a rapid graphical user interface development tool for SmartVU. The IED Control Panel application is a companion product to the IED Wizard but can be used as a stand-alone product. It allows users to interact with a graphic representation of an intelligent electronic device (IED), as if standing in front of it.	No
IED Wizard	ADMS	IED Wizard is a tool that automates the creation of the database for an intelligent electronic device (IED). In just a few simple steps, the wizard creates the required points in the SCADA system database.	No
Interchange Scheduling	Generation Management	This display allows the Operator to define and review scheduled power interchange transactions.	No
Inter-Control Centre Protocol (ICCP)	SCADA	Adding this protocol enables the Survalent SCADA System to exchange data with other utilities using the ICCP (IEC 60870-6-TASE.2) communication protocol.	No
Joint Ownership	Generation Management	Enables the Automatic Generation Control and Economic Dispatch programs to support jointly owned units.	No

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
Lightning Strike Interface	SCADA	The Lightning Strike Interface provides the ability to display lightning strikes on SmartVU displays using user-defined symbols. The system currently supports an interface to the Weather Decision Technology (WDT) service that covers southern Canada, mainland U.S.A. and northern Mexico.	No
Load Curtailment	ADMS	The Load Curtailment application provides the ability to reduce load in response to event triggers. The application monitors a set of database points to determine the control actions to perform. These database points can be set by command sequences, calculated points, external entities via ICCP, or any other mechanism that can trigger a load shed event.	No
Load Management Protocols	SCADA	Including these protocols allows the SCADA system to control customer loads.	No
Major Event Management	OMS	The Major Event Manager (MEM) application provides an easy-to-use records management solution to store and preserve information related to major events. The MEM application automatically collects and combines outage cases, service tickets, and damage reports to provide a single historic or real-time view of a major event.	No
Mobile Crew Manager	OMS	Mobile Crew Manager provides PUC operations teams and field crews with an intuitive web-based application for wireless management of service work. It allows dispatchers, schedulers, field workers and supervisors to access the same real-time information on outage conditions and field service operations, including tags. It is designed for field service organizations with up to several hundred crews.	Yes
Network Data Access Interface	SCADA	The Network Database Access (NDA) application programming interface is a library of functions that allow external applications to access the SCADA system using the Survalent NDA protocol.	Yes
Network Topology Processor	ADMS	The Network Topology Processor calculates the energized/de-energized status of the distribution network based on the topology of the network and the current status of the breakers and switches.	Yes

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
OMS Audit Trail	OMS	This application records in a relational database (Oracle or Microsoft SQL Server) all edits/actions related to outage cases, service tickets, call records, jobs, major events and damage reports. For each change made in the Survalent ADMS, the OMS Audit Trail will record the time of the change, the user who made the change, their role and describe the changes that were made.	No
OMS Dashboard	OMS	The OMS Dashboard web application integrates outage data from multiple sources into a single consolidated view with real-time visualization in two modes: mobile/desktop mode for internal stakeholders and lobby mode for PUC employees and customers. The OMS Dashboard provides increased awareness of important outage information for utility staff. It provides detailed outage data is easier to understand and more actionable through visualization and customized views.	Yes
OPC Server	SCADA	The OPC Server communicates with one or more OPC clients conforming to level 2.05a or 3.0 OPC Data Access (OPC DA) Custom Interface Specification.	Yes
Operations and Outage Accounting	SCADA	The Operations and Outage Accounting function produces daily operations and outage reports.	No
OSIsoft PI Historian Interface	SCADA	This interface provides storing data in PI Historian by OSISoft Inc.	No
Power Factor Control	ADMS	The Power Factor Control application reduces power system losses and power factor penalties by monitoring and correcting the power factor at specified locations within the distribution network and issuing controls to the appropriate substation-level and feeder-level capacitor bank controllers	No
Protection Setting Manager	ADMS	The Protection Settings Manager (PSM) application allows the Survalent system to maintain active protection settings in protection relays. By analyzing the current system configuration, and applying user-defined rules, PSM issues controls to the relays to switch to the appropriate protection settings groups.	Yes
Reserve Monitor	Generation Management	The Reserve Monitor application calculates spinning, non-spinning and total reserves in generating capacity.	No

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
Rotational Load Shedding	ADMS	The Rotational Load Shedding (RLS) application provides an emergency measure when electricity demand will exceed electricity supply for an extended period of time by allowing different portions of the grid to be de-energized and then re-energized on a schedule.	No
SCADA Add-In	SCADA	The SCADA Add-In application makes for a quick and efficient interface between the SCADA database and MS Excel, so reports, graphs, and queries can be easily created.	No
Short-Term Load Forecasting	SCADA	Load forecasting is an important tool for planning and/or triggering load management strategies, or for determining unit commitment schedules.	No
SNMP	ADMS	The System supports the Simple Network Management Protocol (SNMP) V3 for monitoring network devices including switches, servers, workstations, and other devices connected to the communication network.	No
STC Archiver	SCADA	A companion program to STC Replicator, can be used to extend the historical data tables beyond the sizes imposed by the configuration of the SCADA system. The Archiver does this by transferring the data from the replicated tables into a parallel set of archive tables, and allowing the archive tables to grow to a much larger size, or even indefinitely.	No
STC Replicator	SCADA	The STC Replicator is a client/server application that provides real-time data replication of the ADMS database to a SQL Server database residing in a demilitarized zone (DMZ). Data used for web displays, analysis, and reporting can be replicated in near-real-time to a server in a demilitarized zone (DMZ) in order to isolate corporate users from the ADMS production database.	No

OPTION	APPLICATION	DESCRIPTION	INCLUDED IN BASELINE PROPOSAL
Switch Orders and Guarantees	SCADA	A switch order is a sequence of steps involving both supervisory controls and tags that produce conditions for which a guarantee may be issued. Each switch order can contain up to 200 steps. Switch orders can be created using the online editor. Some applications, such as FLISR and VVO, will generate switch orders automatically based on the recommended switching steps. Guarantees, also known as clearances or work permits, are database forms that allow you to define, issue and surrender guarantees. Each guarantee can have up to 50 tags associated with it. Guarantees can be issued independently or as part of a switch order.	No
Volt/VAR Optimization (VVO)	ADMS	The Volt/VAR Optimization (VVO) application performs a coordinated control of regulators, cap banks and switches to optimize the network based on user-selectable objective functions subject to user-configurable constraints.	Yes
Voltage Reduction	ADMS	The Voltage Reduction application provides the ability to reduce, maintain, or restore system voltage in response to event triggers. The application monitors a set of database points to determine the control actions to perform.	No
WebSurv and SurvCentral	SCADA	WebSurv is a powerful platform which serves real-time SCADA information to users via a web browser, without the need for custom installation or maintenance. WebSurv allows Corporate users to call up and view any SmartVU graphical display, substation one-line, or tabular display. WebSurv is a companion product to the STC Replicator.	No

This task will review the available and provided options to determine what specific options will be provided by Survalent in a quote (refer to task VP1.1 Quote Survalent Software). Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO5 Deliverables

Deliverables provided by task VO5 Evaluate ADMS and VVO Options are listed in Table 7.

Table 7 Task VO5 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Evaluation of Survalent options.	VO5 Evaluate ADMS and VVO Options		■	■	

VO5 Reviews

The deliverables for task VO5 Evaluate ADMS and VVO Options will be issued with one final review.

VO5 Assumptions

1. The PUC will provide experienced resources who can provide input on Survalent's available options and PUC functional requirements.

VO6 Identify the Virtual Server Requirements

This task will define the virtual server requirements for the production, test (Project Development System, or PDS), training (Operator Training Simulator, or OTS), Quality Assurance System (QAS), and advanced historian. This task must be completed before the start of task VP1.1 Quote Survalent Software.

For the hardware, Survalent's greatest concern is the hard drive size; minimum hard drive size is driven by the number of data points being logged, sample rate (or frequency of logging), and duration of historical data being maintained in the database. Expected virtual server requirements are a one terabyte (TB) hard drive, 16 gigabyte (GB) of random access memory (RAM), and operating system requirement of Microsoft Windows Server 2012R2 Standard Edition.

This task will also review the PUC's applicable procedures for server migration so that they can be evaluated for applicability to migrating the existing SCADA system to virtual servers.

VO6 Deliverables

1. Specification of Survalent's requirements for the PUC's virtual server environment.
2. Evaluation of PUC's applicable procedures for server migration.

VO6 Reviews

The deliverables for task VO6 Identify the Virtual Server Requirements will be issued with one final review.

VO6 Assumptions

1. The PUC will provide experienced resources who can provide input on PUC's hardware standards supporting their virtual servers.

VO7 Evaluate Cybersecurity

This task will evaluate and report what cybersecurity[7] requirements are to be met by each of the following, identifying who is responsible for meeting those requirements (e.g., technical controls, policies, procedures) through specific tasks such as design and testing:

- CIS (refer to task EA1.2 CIS for the detailed design)
- IVR (refer to task EA1.1 IVR for the detailed design)
- CYME integration (refer to task EA1.3 CYME Integration)
- AMI (refer to task EA1.4 AMI)
- SCADA/ADMS/OMS (as a singular, integrated platform)

[7] The term "cybersecurity" used in this document refers to both "cyber security" (the security of the communications equipment, regardless of IP-based or serial-based) and "physical security" (the physical protection of the equipment associated with the electrical and communication assets).

- Testing lab (refer to task EA7.1 Design Lab Facility and Test System)
- Field devices and associated field equipment, for example:
  - Equipment cabinets installed in the field may be required to be capable of being locked using the PUC's standard padlock (with the locks provided by the PUC), plus have a door contact wired to an IED status point as available from an IED vendor's standard offering with mapping of the point back to SCADA for monitoring the physical security of the field equipment.
  - The cyber security features implemented by the IEDs and software procured by the SSG project meet the PUC's requirements for cyber security related settings with appropriate default settings for field installation that will be modified in the field (e.g., passwords).
  - Cellular radios will meet the cyber security requirements for all applications being supported by the radios.
- Deliverable posting (e.g., if deliverables can be posted with version control on a project portal accessible by all project team members).
- Substations and control centers, for example:
  - Whether PUC has existing and adequate cybersecurity as well as routing and switching hardware that can be easily adapted by the PUC to support the application of the PUC's cyber security requirements to the SSG project
  - Whether PUC has adequate physical security at substations and control center.
- Storage of PUC-provided data, for example, whether data provided by the PUC has restrictions (e.g., based upon applicable regulations) on storage and transmission, whether it includes Personally Identifiable Information (PII) or not.
- Data flow diagrams and whether existing drawings for in-scope systems (existing or new) and they meet the specified requirements.

VO7 Deliverables

1. Report outlining the cyber security requirements for the SSG Project including any impacts on project scope, schedule, or budget.

VO7 Reviews

The deliverables for task VO7 Evaluate Cybersecurity will be issued with one final review.

VO7 Assumptions

1. The PUC will provide experienced resources who can provide input on PUC's cyber security requirements.

VO8 IVR

This task will develop a conceptual design for the IVR integration including a workshop and report. PUC presently uses Tele-works (cloud-based) IVR for outbound calling. Some use cases are:

- Contacting customers that will be impacted by a scheduled outage. The call list is pulled from GIS, where a boundary is defined on outage planning/ notifications.

- Local area surveys of customers.
- Performing collections reminder calls.

One incoming call use case is to collect credit card payments, where customers are redirected to the Paymentus site or a phone number is provided. Here PUC uses Paymentus (cloud based) with Northstar CIS to collect the credit card payments.

VO8.1 Plan and Conduct IVR Integration Workshop

This task will plan and conduct an IVR design workshop to:

1. Document the IVR-OMS MultiSpeak requirements by answering questions such as:
    a. What are the use cases for the interface?
    b. How do the existing workflows impact interface triggers?
    c. What information is required by the OMS and in what format using what methods?
    d. Are any data transformations required?
    e. What data is missing from the IVR system that the OMS requires?
    f. How should the OMS respond/behave?
    g. What priority is the data transfer?
    h. How are errors handled and reported?
2. Develop the use cases for the MultiSpeak integration, such as:
    a. The IVR communicates with the OMS to determine a location's current service status.
    b. The IVR sends trouble reports to the OMS so that the OMS can create trouble reports.
    c. The OMS will send callback requests to the IVR to perform outgoing restoration confirmation call backs for callers that requested a callback.
    d. The OMS will send close call requests to the IVR for restored trouble reports for callers that did not request a callback.
    e. The IVR will send StillOff callback results to OMS for callers indicating they are still experiencing service interruptions.
    f. The IVR will send ResolvedCaller requests to update outage call records that have been changed to be associated with a different service location.
2. Develop the MultiSpeak requirements for the IVR system so that the interface provides the required data (i.e., determine if the IVR interface is Survalent's standard MultiSpeak interface only).
3. Develop other use cases that do not require MultiSpeak integration, if the Milsoft IVR will replace the existing Tele-Works and Paymentus systems.
4. Work with Milsoft to establish tasks and milestones that will be added to the schedule for monitoring as part of normal project management activities (refer to task PM5 Overall Schedule, Phases, and Milestones).
5. Establish conceptual documentation, testing, commissioning, maintenance, and training requirements.
6. Identifies any potential organizational and/or process changes for input into task VB1 Organizational Change .

VO8.2 Prepare IVR Integration Report

Upon completion of task VO8.1 Plan and Conduct IVR Integration Workshop, this task will prepare a report that:

1. Documents the IVR-OMS MultiSpeak requirements.

3. Documents the IVR use cases and other requirements that can be included in a scope of work so that Milsoft can provide a quote for the required work.
2. Provides the conceptual testing plan.
3. Provides the conceptual maintenance plan.
4. Identifies any conceptual organizational and/or process changes for input into task VB1 Organizational Change .
5. Assesses impacts to project scope, schedule, and budget.

The PUC will review and approve the recommendations. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO8 Deliverables

Deliverables provided by task VO8 IVR are listed in Table 8.

Table 8 Task VO8 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. IVR integration report.	VO8.2 Prepare IVR Integration Report		■	■	

VO8 Reviews

Refer to Review Procedure.

VO8 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

VO9 CYME

This task will develop a conceptual design for the CYME integration including a workshop and report.

VO9.1 Plan and Conduct CYME Integration Workshop

This task will plan and conduct a CYME integration workshop to:

1. Discuss the critical dependency of the proposed FDIR and VVO applications on accurate GIS data and timely CYME updates.
2. Develop the interface requirements between the Survalent system and CYME to support the conversion of geometric map features from the PUC's provided CYME data files into Survalent's electrical network model.
3. Identify any expected impacts on CYME that also impact scope, schedule, or budget. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.
4. Establish the methodology and constraints for the import process.
5. Identifies any potential organizational and/or process changes for input into task VB1 Organizational Change .
6. Establish the general documentation, testing, commissioning, maintenance, and training requirements.

VO9.2 Prepare CYME Integration Report

Upon completion of task VO9.1 Plan and Conduct CYME Integration Workshop, this task will prepare a report that:

- Documents the interface requirements.
- Provides the CYME conversion methodology and constraints.
- Addresses any CYME impacts.
- Identifies conceptual organizational and/or process changes for input into task VB1 Organizational Change .
- Provides the conceptual testing plan.
- Provides the conceptual training plan.
- Provides the conceptual maintenance plan.

The PUC will review and approve the recommendations. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO9 Deliverables

Deliverables provided by task VO9 CYME are listed in Table 9.

Table 9 Task VO9 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. CYME integration report.	VO9.2 Prepare CYME Integration Report		■	■	

VO9 Reviews

Refer to Review Procedure.

VO9 Assumptions

1. The PUC will provide experienced resources who can provide input on the CYME model.

VO10 Review Enhanced CSR/Customer Toolset

This task will review whether there is opportunity to improve the organization and presentation of data from the IVR, OMS, and ADMS for a CSR. A customer-friendly user interface is desired so that the CSR can better answer a wider set of customer questions with defensible data from these systems.

This task will evaluate the capabilities provided and will identify alternatives and recommend a path forward for additional work to achieve additional functionality, whether through another software platform:

- If the PUC has already achieved the solution scope recommended herein, no further work will be required for this task.
- If not, the PUC will determine whether additional work is warranted to benefit the SSG. The PUC will review and approve the recommendations. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO10 Deliverables

1. Evaluation outlining recommendations for an enhanced CSR/customer toolset, including any impacts on project scope, schedule, or budget.

VO10 Reviews

The deliverables for task The PUC will provide experienced resources who can provide input on the CYME model.

VO10 Review Enhanced CSR/Customer Toolset will be issued with one final review.

VO10 Assumptions

1. The PUC will provide experienced resources who can provide input on the CSR needs to provide customers with data from the SSG.

VO11 Review Lab Facility

A lab for testing utility automation systems is recommended for implementing and maintaining the SSG. The PUC has an existing 19" rack in stations that is being used as a mini-lab. Otherwise, the PUC has limited space available for dedicated lab space. This task will review what locations are available along with their limitations compared to the needs, including whether a temporary location is needed for the project with a permanent location after project completion. For example, when testing is complete, will the test system be removed from the lab and moved to a location specified by the PUC with a minimum of 1,000 square feet of available space with adequate power and communications capabilities to support the test lab on a permanent basis. In this scenario, costs for moving the test system from the lab testing facility to a PUC-specified location in Sault Ste. Marie will be evaluated. Permitting issues will be identified in task VF5.1 Local Permits.

This task will evaluate the options available for a lab facility along with the impacts on scope, schedule, and budget. This task will provide the PUC with a recommendation. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO11 Deliverables

Evaluation outlining recommendations for a lab facility.

VO11 Reviews

1. The deliverables for task VO11 Review Lab Facility will be issued with one final review.

VO11 Assumptions

1. The PUC will provide experienced resources who can provide input on the available of space and current experience with the existing lab facility.

VO12 AMI Integration

This task will conceptually design the MultiSpeak interface between the Survalent ADMS and the Sensus AMI so that the AMI system provides the data required by the ADMS in support of VVO. This task will begin with a workshop and finish with the creation of a design report.

VO12.1 AMI Integration Workshop

This task will plan and conduct an AMI integration workshop to:

2. Develop the interface requirements between the Survalent system and Sensus AMI system to support the following functions:
    a. Ping, disconnect and reconnect meters (with or without arming).
    b. Receive unsolicited outage and event reports from meters.
    c. Read voltages and other data on demand or on schedule (e.g., hourly), from bellwether meters and other meters, where scheduled readings will be displayed on the map and used by other applications, such as command sequencing, VVO, etc.
3. Document the AMI-ADMS interface requirements:
    a. What are the use cases for the interface?
    b. How do the existing workflows impact interface triggers?
    c. What information is sent and requested, in what format and exactly where is it sent?
        i. Outage events (from AMI)
        ii. Restore events (from AMI)
        iii. Power status (bi-directional)
        iv. Outage history (from AMI)
    d. Are any data transformations required?
    e. What data is missing from the AMI system that the OMS requires?
    f. How should the receiving system respond/behave?
    g. What priority are these information transfers?
    h. How are errors handled and reported?
4. Identify any expected impacts on the AMI communication network. The AMI communications networks must be sufficient in capacity to support the implemented applications (i.e., VVO and OMS). Sensus will provide guidance on the impact of increased reads (such as voltage) and any work required on the AMI communications network to attain sufficient application performance. For example, determining whether additional towers are needed in the AMI communications network and whether any replacement of meters is required. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

5. Establish the methodology and constraints for bellwether meters, such that they are a subset of the total number of AMI meters and can be supported by the AMI communications network.
6. Determine what Sensus work is required and establish tasks and milestones that will be added to the schedule for monitoring as part of normal project management activities (refer to task PM5 Overall Schedule, Phases, and Milestones).
7. Establish the documentation, testing, commissioning, maintenance, and training requirements.
8. Identify potential impacts on business processes and organizational structure.
9. Evaluate existing software and support. The integration could require changes in the supported versions of the proposed Survalent system and the existing Sensus AMI system. Any changes required will be evaluated to see if they can be accomplished under existing software releases and maintenance agreements. Modification of the existing contract between the PUC and Sensus may need to include new work scope via task order.

VO12.2 AMI Integration Report

Upon completion of task VO12.1 AMI Integration Workshop, this task will prepare a report that:

1. Addresses any AMI communication network impacts.
2. Evaluates the Sensus scope and estimate of work.
3. Identifies any conceptual organizational and/or process changes for input into task VB1 Organizational Change .
4. Provides conceptual testing plans.
5. Provides conceptual training plans.
6. Provides conceptual maintenance plans.
7. Discusses schedule updates.

Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

VO12 Deliverables

1. Report outlining the requirements of the AMI integration.

VO12 Reviews

The deliverables for task VO12 AMI Integration will be issued with one final review.

VO12 Assumptions

1. The PUC will provide experienced resources who can provide input on the AMI system.

PUC Field Domain

The PUC Field Domain includes following major tasks:

- VF1 Calculate Feeder and 34.5kV Performance (CMI)
- VF2 Field Engineering
- VF3 Future Reliability and Energy Savings Performance
- VF4 Select Feeders (12/24/36/48)

VF1 Calculate Feeder and 34.5kV Performance (CMI)

This task will calculate the reliability indices on a feeder basis because currently the reliability indices are only calculated at the distribution grid level (only distribution grid level reliability information is reported to the OEB). Feeder-level reliability data is required in order to select the individual feeders that will have FDIR applied to them in task VF4 Select Feeders (12/24/36/48). Insight on historic outages will

be gained through analysis of the PUC's outage database (the basis for reported reliability metrics to the OEB) for the most recent two years of data because PUC has been capturing better outage data over that same period. Outages associated solely with the 34.5 kV sub-transmission system will be isolated from distribution outages and outages associated with distribution primary voltage less than 12.5 kV will be ignored.

The CMI and reliability indices will be calculated to establish the worst performing in-scope distribution feeders and 34.5 kV sub-transmission circuits. Feeder-level average CMI data will be estimated using the outage data for each feeder and PUC system-level reliability data. Average values will be based upon outage and reliability data from 2013 through 2018 (refer to Table 10 for published reliability data). The CMI value for each outage event will be computed by multiplying the number of customers impacted by each event by the event duration. Events occurring at the same location will be grouped together. Locations of the grouped events with large CMI values (greater than 10,000) will be mapped to individual feeders. Feeders will be segregated into four CMI groups based on the average CMI data. Each CMI group will be assigned a weight based on average feeder CMI values in that group. The results will be similar to that shown in Table 10, which shows the previous ranking of each feeder of potential improvement for the 40 PUC feeders originally proposed for FDIR back around 2015. This table shows the average per-feeder CMI values for the years 2008 to 2012 (excluding 2011) along with the number of recommended switches, reclosers, and FCI.

Table 10 PUC Reliability Indices from 2008 to 2018

YEAR	SAIDI (HOURS)	CAIDI (HOURS)	SAIFI
2008	2.25	1.30	1.70
2009	2.20	0.73	3.00
2010	2.10	0.73	2.85
2011	2.92	0.81	3.61
2012	1.65	0.76	2.17
2013	11.91	3.27	3.64
2014	1.19	0.98	1.21
2015	16.94	3.85	4.40
2016	5.46	2.12	2.57
2017	1.07	0.87	1.23
2018	2.34	1.34	1.75
Average	**4.55**	**1.52**	**2.56**

Sub-transmission outage CMI data will be estimated by focusing on outage causes indicating loss of 34.5 kV lines. Outages will be categorized as those that could be minimized by the 34.5 kV system by confirming that the outage is not associated with a single point of failure in the 34.5 kV supply (e.g., a downed pole carry both lines of supply) or other factors such as insufficient capacity on the lines.

Changes in performance will be calculated and tabulated for the ten 34.5 kV circuits in a similar fashion to that shown in Table 15.

VF1 Deliverables

1. Report that documents the historical feeder reliability indices for feeder and sub-transmission circuits in a similar format to the historical data shown in Table 15.

VF1 Reviews

The deliverables for task VF1 Calculate Feeder and 34.5kV Performance (CMI) will be issued with one final review.

VF1 Assumptions

1. The PUC will provide experienced resources who can provide the historical outage database and support the interpretation of data.
2. PUC will provide access to outage data, whose access will meet PUC's cyber security requirements without adversely impacting project scope, schedule, or budget.
3. PUC historical data requires minimal manipulation to calculate reliability indices for each feeder and sub-transmission circuit.

VF2 Field Engineering

This task will develop a conceptual design so that the complete scope is understood to provide a firm, fixed price to support distribution automation (FDIR and VVO applications) as shown in Table 12 and Table 13 (voltage regulators and capacitors). This task will also establish where a PoC will be performed for the VVO application. The PUC will review and approve all recommendations provided in deliverables for this task so that they are incorporated into Step 2.

VF2.1 Establish Feeder Zones

This task will establish the feeder zones for each feeder and the substation and feeders. The number of switches, reclosers, and FCI will be determined for each feeder by dividing them into equal zones by the placement of reclosers using several factors, such as:

- Feeder circuit length (e.g., zones may have equal electrical length, but lengthy feeders may have two or three reclosers recommended as shown in Table 12)
- Connected kVA (e.g., zones may have equal connected kVA, indicating equal customer counts for each zone to equally share the improvement benefit)
- Topology
- Back-feed capability (switches will be primarily used for feeder ties),
- Operational considerations (e.g., if detailed historical data indicates there are poor reliability feeders, two reclosers may be recommended)

In general, one load-break tie switch will be used for each zone of the feeder to allow that section to be back-fed by an adjacent feeder during an outage. Switch placement will be established based upon several factors, such as:

- Adjacent feeder peak load
- Different substation/transformer source

- Adjacent feeder also implements FDIR

In addition to reclosers and switches, the FDIR system includes FCI that will be installed on selected overhead and underground feeders. The underground distribution system in downtown Sault Ste. Marie has many S&C Electric 4-way PMH switches, which are being operated without any protection or fault indication equipment on them. This makes it rather difficult to locate faults in this part of the system. Therefore, Contractor still recommends FCIs be installed at PMH switches and k-bars and that overhead FCIs be installed on some feeders to further improve reliability by reducing fault location time. This analysis will focus on feeders using various criteria, such as whether the placement meets PUC criteria by considering circuit placement, customer voltage, reactive loads, cellular coverage, or other site-specific considerations.

In addition to these criteria, the process may also use IEEE P1806 "Guide for Reliability Based Placement of Overhead and Underground Switching and Overcurrent Protection Equipment Up to and Including 38 kV" in selecting equipment locations.[8] The result of this selection will be similar to that shown in Table 15, which shows the PUC feeders with the previously recommended number of zones per feeder, including the connected kVA (CKVA) per zone along with the electrical length (EL).

Table 11 Proposed Feeder Zones with Connected KVA (CKVA) and Electrical Length (EL)

FEEDER	# OF ZONES	TOTAL CKVA	ZONE 1 CKVA	ZONE 2 CKVA	ZONE 3 CKVA	ZONE 4 CKVA	TOTAL EL (FT)	ZONE 1 EL (FT)	ZONE 2 EL (FT)	ZONE 3 EL (FT)	ZONE 4 EL (FT)
1-11	2	13050	7350	5700			17782	9672	8110		
1-12	2	8235	2535	5700			41673	19469	22205		
1-13	2	12703	7500	5203			19879	10623	9255		
1-14	2	3513	1933	1580			16030	9104	6926		
2-13	2	9111	4013	5098			26936	16043	10892		
2-14	2	7635	2900	4735			14383	6716	7667		
2-15	2	9135	5200	3935			47818	25781	22037		
2-16	2	8325	3850	4475			30066	17064	13002		
4-02											
4-04											
4-11											
4-12											
5-01											
5-02											
5-03											

[8] IEEE P1806 guide provides means and methodologies for proper placement of switches and protective devices to achieve the desired performance characteristics and reliability for distribution circuits, including feeder and branch line equipment, with operating voltages up to and including 38 kV. Drivers for device placement, such as reliability and operational considerations are identified. Various types of switching and overcurrent equipment are covered such as: manual switches, automated switches, reclosers, sectionalizers, and fuses. Impacts on reliability and device placement are addressed for factors such as fault rate, interruption duration, exposure miles, customers affected and distribution automation and automated restoration. P1806 is presently expected to be published in 2020 and is currently forming its balloting group.

FEEDER	# OF ZONES	TOTAL CKVA	ZONE 1 CKVA	ZONE 2 CKVA	ZONE 3 CKVA	ZONE 4 CKVA	TOTAL EL (FT)	ZONE 1 EL (FT)	ZONE 2 EL (FT)	ZONE 3 EL (FT)	ZONE 4 EL (FT)
5-04											
5-05											
10-01											
10-02											
10-03											
11-11	2	7818	5978	1840			57139	30863	26276		
11-12	2	1650	3120	4530							
11-13	2	6018	3713	2305			52451	31978	20472		
11-14	2	7903	4515	3388			34423	13852	20571		
12-11	2	4916	1853	3063			49908	22352	27556		
12-12	2	5926	2813	3113			47044	21148	25896		
12-13	2	6973	3110	3863			39580	21460	18120		
12-14	2	5413	1888	3525			22224	11467	10758		
13-01	2	10188	3295	6893			54688	17421	37267		
13-02	2	9000	3720	5280			59715	24672	35043		
13-03	2	7793	2913	4880			43219	16942	26276		
13-04	2	4330	1435	2895			33527	12992	20535		
15-01	2	5475	1625	3850			8156	2875	5282		
15-02	2	3001	970	2031			8048	4354	3694		
15-03	2	4798	2170	2628			15135	8005	7129		
15-04	2	2895	250	2645			10935	6883	4052		
16-01	2	12718	6480	6238			113133	49764	63369		
16-02	3	18543	6905	8085	3553		59022	12080	13409	33533	
16-03	3	11053	4255	2308	4490		105371	18051	29022	58297	
16-04	2	10017	4329	5688			55049	9698	45351		
18-01	4	17378	5903	3185	3965	4325	304469	74370	71027	83537	75535
18-02	2	7620	3490	4130			78638	38960	39678		
18-03	2	3534	1095	2439			23484	11345	12139		
18-04	3	15676	5723	2613	7340		268648	96906	26234	145509	
19-01	0	1625					30878				
19-02	2	8819	3607	5212			59843	27369	32474		
19-03	3	15383	5153	66780	3450		44075	14318	18251	11506	
19-04	2	9199	5054	4145			54662	32474	22188		
20-01											
20-02											
20-03											

FEEDER	# OF ZONES	TOTAL CKVA	ZONE 1 CKVA	ZONE 2 CKVA	ZONE 3 CKVA	ZONE 4 CKVA	TOTAL EL (FT)	ZONE 1 EL (FT)	ZONE 2 EL (FT)	ZONE 3 EL (FT)	ZONE 4 EL (FT)
20-04											
21-01	2	9210	5230	3980			54560	30479	24081		
21-02	2	8573	4328	4245			67657	42008	25650		
21-03	2	10963	3303	7660			64839	27215	37625		
21-04	2	6618	3638	2980			20896	7060	13835		

This task will also recommend where the PoC for VVO will be performed using analysis of expected VVO savings against estimated FDIR costs. Final selection will be performed by the PUC. Coordination is required with the feeder selection for the FDIR PoC that will be performed in task VF4 Select Feeders (12/24/36/48).

VF2.2 Establish Bellwether Locations

Grid optimization requires the selection of optimal locations for voltage monitoring on a distribution circuit. The selection process is a challenge because of the dynamic, seasonal characteristics of the different loads connected to the distribution circuit. Traditional SCADA devices can provide some visibility into the voltage profile at a limited number of points along the primary three-phase distribution line, typically only at substations, which may not represent the lowest or highest voltage on the circuit. The voltage profile will also vary with daily, weekly, monthly, and seasonal load changes. As a result, selecting a few locations to provide voltage inputs to a grid optimization program like VVO is a challenge.

This task will identify the tool to use to identify (e.g., Sensus AMI data) for the voltage violations (both high and low) on a per feeder/ substation basis and a seasonal basis to create a list of potential bellwether meter locations. This data will be used along with circuit analysis performed in VF2.4 Perform Load Flow Analysis of Feeders to select potential bellwether meter locations that will be finalized in task EA1.4.1.1 Finalize Bellwether Meter Selection.

VF2.3 Standardized Field Equipment Designs

This task will create the field equipment design standards or templates with associated bill of material for major equipment, which will be leveraged for the detailed design of each confirmed field location of equipment related to FDIR and VVO applications (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, and FCI; refer to Table 13). Design templates will be engineered to meet the Ontario Regulation 22/04.

Site-specific design occurs in task EF1 Detailed Design for Field Equipment.

VF2.3.1 Create Field Equipment Template Design Drawings

This task will review existing design standards (or construction standards) for major electrical equipment installation for the major electrical equipment installed in the field (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, and FCI; refer to Table 13), including how the cellular modem will be incorporated into the design and addressing who is providing the cellular modem in coordination with task VP1.2 Quote Cellular Equipment and task VP1.3 Quote Field Equipment. Existing PUC standards will be leveraged where possible, including standard materials such as the PUC wood pole standard for western red cedar. Any missing standards will be obtained from the Utilities Standards Forum (USF) by the PUC to support the Step 2 schedule. Approvals per Ontario Regulation 22/04 will be obtained for new materials and equipment not already carried by the PUC before those materials are included in any standard designs.

This task will create a standard bill of materials to support the procurement of major materials (refer to task PR1 Major Materials and Equipment) and minor materials (refer to task PR2 Purchase All Other Materials and Equipment).

The PUC will provide examples of work order packages so that the incorporation of standards can be understood.

Vendor coordination is included in this task as required.

VF2.3.2 Create Standard Feeder Protection Schemes

This task will create standard feeder protection schemes required for the major electrical equipment (refer to Table 13). The standard schemes will be applied on a site-specific basis in task EF1.2 Perform Protection Coordination Studies.

VF2.3.3 Create Cellular Equipment Template Design Drawings

This task will create design template drawing (or construction standard) for the cellular equipment installed in major electrical equipment (refer to Table 13). The cellular equipment drawing details may be included in the template drawings for the major electrical equipment.

Table 12 List of Feeders Supporting FDIR[9] and VVO with Field Equipment Quantities

	FDIR						VVO			
12.5 KV FEEDER	# POLE TOP SWITCHES	# POLE TOP RECLOSERS[10]	# 2-WAY PADMOUNT SWITCHES	# 4-WAY PADMOUNT SWITCHES	O/H FCI	U/G FCI	STA. REG 333 KVA	FDR. REG 167 KVA	CAPACITOR 600 KVAR	FEEDER REPHASING
1-11				1		8	1			
1-12			1	1			1			2
1-13				1		5	1			
1-14	1	1				3	1			1
2-13	1	1					1			
2-14			1			3	1			
2-15							1			
2-16							1			
4-02										
4-04										
4-11										
4-12										
5-01										
5-02										
5-03										
5-04										
5-05										
10-01										
10-02										

[9] The number of feeders and equipment has been reduced 35% in accordance with PUC direction.
[10] Reclosers are ordered with SpeedNet™ radios included.

12.5 KV FEEDER	FDIR						VVO			
	# POLE TOP SWITCHES	# POLE TOP RECLOSERS[10]	# 2-WAY PADMOUNT SWITCHES	# 4-WAY PADMOUNT SWITCHES	O/H FCI	U/G FCI	STA. REG 333 KVA	FDR. REG 167 KVA	CAPACITOR 600 KVAR	FEEDER REPHASING
10-03										
11-11	1	1					1			
11-12	1	1					1			2
11-13	1	1			2		1			
11-14	1	1					1			1
12-11	1	1								
12-12	1	1								
12-13	1	1								
12-14	1	0	1							
13-1							1			
13-2							1			
13-3							1			
13-4							1			
15-01			1	1		2				
15-02		1								
15-03	1	1								
15-04	1	1								
16-01	2	1					1			2
16-02	2	2					1			
16-03	1	2					1		1	
16-04		1					1		1	1
18-01	3	3			3		1	1		1
18-02	1	1			2		1			1

12.5 KV FEEDER	FDIR						VVO			
	# POLE TOP SWITCHES	# POLE TOP RECLOSERS[10]	# 2-WAY PADMOUNT SWITCHES	# 4-WAY PADMOUNT SWITCHES	O/H FCI	U/G FCI	STA. REG 333 KVA	FDR. REG 167 KVA	CAPACITOR 600 KVAR	FEEDER REPHASING
18-03	1	1			2		1			1
18-04	1	2			1		1	1		
19-01							1			
19-02	1	1			2		1			
19-03	2	2					1			
19-04	1	1			2		1			
20-01							1			
20-02							1			
20-03							1			
20-04							1			
TOTAL	27	29	4	4	14	19	32	2	2	12

Table 13 Conceptual Major Electrical Equipment and Field Devices Bill of Material

EQUIPMENT TYPE FROM TABLE [12]	FDIR OR VVO	VENDOR	DESCRIPTION	QUANTITY	SCOPING LEGEND[11]
Pole top Switches	FDIR	S&C	SCADA-Mate 15kV, with controller (IED)	TBD (26)	E
Pole top Reclosers	FDIR	S&C	Intellirupter 15kV, with SpeedNet™ Radio and controller	TBD (25)	D
2-way Pad mount Switches	FDIR	S&C	PMH-3 underground 15kV switchgear, with 6801 automatic switch controller	TBD (3)	G
4-way Pad mount Switches	FDIR	S&C	Vista 4-Way underground 15kV switchgear, with controller	TBD (3)	F
O/H FCI	FDIR	Eaton	O/H FCI- Eaton GridAdvisor Series II, 3phase set	TBD (30)	J
U/G FCI	FDIR	Eaton	U/G FCI- Eaton GridAdvisor Series II, 3phase set	TBD (19)	K
Sta. Reg 333 KVA	VVO	Eaton	Substation Regulators, 333 kVA, 438A, 14.4kV, 150 kV BIL (set of 3), with CL-7 control (IED)	TBD (32)	C
Fdr. Reg 167 KVA	VVO	Eaton	Line Regulator, 167kVA, 200A, 7.62 kV, 95kV BIL (set of 3), with CL-7 control (IED)	TBD (2)	B
Capacitor 600 KVAR	VVO	Eaton	3x200kVAr, 12.5kV	TBD (2)	A
	Auto Transfer	Eaton	O/H FCI- Eaton GridAdvisor Series II, 3phase set	TBD (16)[12]	L

VF2.3.4 Field Devices Template Maintenance Plan

This task will develop the template maintenance plans for the field devices (controllers and cellular equipment). Note that some of the maintenance plans may be only the provision of the vendor's manual that includes a section on operation and maintenance.

VF2.3.4.1 Develop Field Device Maintenance Plans

This task will develop the maintenance plans for all of the field devices (refer to Table 13).

[11] Refer to Appendix 1 – Scoping and Logical Diagrams, where the alpha character in Table 13 can be matched up with alpha characters in circles on the scoping diagram. This shows where the equipment in these tables is installed in the proposed system architecture.

[12] Used for FDIR on the sub-transmission system as follows, assuming 2 per substation and 8 substations.

VF2.3.4.2 Develop Cellular Maintenance Plan

This task will develop the cellular equipment maintenance plan.

VF2.4 Perform Load Flow Analysis of Feeders

This task will perform distribution circuit analysis (load flow) in CYME based upon the feeders shown in Table 12 and the output of task VO1 Update CYME Model. The study will consider load feeder balancing (re-phasing) and circuit conditions (e.g., loading, low voltage, high voltage). This task will create a report documenting the results of the circuit analysis and providing the final model. The output of this task is required for task EA1.4.1.1 Finalize Bellwether Meter Selection.

VF2.5 Conduct Field Survey

Once the feeder analysis in task VF2.4 Perform Load Flow Analysis of Feeders is complete and potential locations are identified, a field survey will be conducted to establish an initial design for installing the field equipment (refer to Table 13) that will be enough to provide firm-fixed pricing for the detailed design, procurement, installation and commissioning. The detailed design task will be completed in task EF1 Detailed Design for Field Equipment.

In particular, at least the following will be addressed during the field survey:

1. Cellular coverage and appropriate mounting location for cellular antenna.
2. Line current (for FCI only)[13]
3. Phase identification (for FCI only)
4. Specific field location, for example:
    a. Substation regulators installation location, e.g., rated as shown in Table 13 and installed on an "H-frame" structure at the feeder exit outside the substation fence or inside the substation (whether on pads or as substation transformer replacement[14]).
    b. Underground switch and recloser replacement can be one for one and whether additional underground cabling or foundation work will be required to install these devices.
    c. Proper pole size and class for the equipment being installed on it or if a new pole is required.
5. Availability of secondary voltage, preferably within one span of new equipment to provide power for new IEDs.
6. Whether hot line work will be performed on distribution circuits requiring pole and/or equipment installation on those circuits.
7. If circuits not being worked on that are adjacent or underbuilt can be left in an energized state or if outages are required based upon the PUC's requirements.
8. If new pole installation is required and be dug by vacuum truck.
9. Whether imported granular material for backfilling of pole holes will be used.
10. Whether new guying or anchoring will be needed.
11. If the PUC will perform isolation and restoration activities on the power system.

The field survey work will not consider distribution line improvements or pole improvements not directly associated with this project's scope of work. For example, the re-phasing work will not upgrade

[13] The GridAdvisor II has a nominal current range of 3 – 600 A with a ±1% accuracy, with capability up to 20 kA of fault current. A minimum of 3 A of current is required for energy harvesting.

[14] During the meetings held with the PUC and IECo on April 10, 2017, all substation locations were reviewed using Google Earth. It was observed that many substations had no room for pole-mounted regulators nor pad-mounted regulators. Replacement of the existing transformers to transformers with an LTC appeared to be the only option at some substations. The site visits will be used to confirm the best approach.

the tap to the most recent distribution design standards, replace fuses, or install fuses; but be a simple transfer.

This task will create a VVO and FDIR conceptual design report that details the results of the field surveys, including the identification of alternatives that could have potential benefits, for example:

1. Voltage control design alternatives, which will include in some locations comparing base scope overhead voltage regulator solutions with alternatives using station transformers with on-line tap changers or pad mounted equipment solutions considering costs, space limitations and in some location's aesthetics
2. FDIR switching location alternatives, considering optional points for value (cost, accessibility, potential performance and aesthetics)

The PUC will review and approve the recommendations so they can be incorporated into Step 2.

VF2 Deliverables

Deliverables provided by task VF2 Field Engineering are listed in Table 14.

Table 14 Task EF1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Report that documents the feeder zones and bellwether meter locations for each in-scope distribution feeder. The report will also identify substation for the PoC for VVO.	VF2.1 Establish Feeder Zones VF2.2 Establish Bellwether Locations		■	■	
2. Approval of equipment and materials not already carried by the PUC.	VF2.3.1 Create Field Equipment Template Design Drawings		■	■	
3. A final list of the FDIR and VVO application bill of material (refer to Table 13).	VF2.3.1 Create Field Equipment Template Design Drawings		■	■	
4. A final list of the cellular equipment bill of material (refer to Table 13).	VF2.3.3 Create Cellular Equipment Template Design Drawings		■	■	
5. Template FDIR and VVO application design drawings (refer to Table 13).	VF2.3.1 Create Field Equipment Template Design Drawings	■[15]	■[16]	■	
6. Template cellular equipment design drawings.	VF2.3.3 Create Cellular Equipment Template Design Drawings	■[15]	■[16]	■	
4. Distribution feeder analysis report.	VF2.4 Perform Load Flow Analysis of Feeders		■	■	
7. Template the maintenance plan for the field equipment and FDIR and VVO applications (refer to Table 13).	VF2.3.4.1 Develop Field Device Maintenance Plans		■	■	
8. Template maintenance plan for the cellular equipment.	VF2.3.4.2 Develop Cellular Maintenance Plan		■	■	
9. Field survey report proposing all equipment locations with pictures and mapping information; associated analysis; and identifying any deviations from the planned scope of work.	VF2.5 Conduct Field Survey		■	■	

[15] The preliminary design includes schematics.
[16] The final design incorporates comments from the preliminary design and includes wiring diagrams.

VF2 Reviews

Refer to Review Procedure.

VF2 Assumptions

10. The number of field survey trips included is at most one per feeder for task.
11. Feeder ties (switches) have sufficient capacity to handle load back-feed conditions.
12. The PUC will provide adequate voltage data from existing AMI meters to support bellwether meter selection.
13. PUC voltage data requires minimal manipulation to perform analysis.

VF3 Future Reliability and Energy Savings Performance

This task will calculate future reliability indices, FDIR cost, and VVO savings.

VF3.1 Estimate Future VVO Savings

This task will estimate the energy savings from implementing VVO on each in-scope distribution station or feeder. This task will use the updated estimates to equipment counts provided from task VF2.1 Establish Feeder Zones to estimate VVO savings. The process may also use IEEE P1885 "Guide for Assessing, Measuring and Verifying Volt-Var Control Optimization on Distribution Systems" to select an appropriate method for assessing the performance of VVO during project delivery.[17]

VF3.2 Estimate Future Reliability Indices

This task will calculate the estimated performance with the proposed feeder zones for each in-scope distribution feeder. Table 15 provides the SAIDI, CAIDI, and SAIFI reliability indices reported by the PUC and obtained from the Ontario Electric Board electricity distributor yearbooks[18]. Note that the Leidos final design report included an average developed from the years 2008 through 2012, excluding 2011 outage data per PUC guidance regarding the excessive number of outages experienced during solar integration projects in Sault Ste. Marie. The process may use an average developed from the data from 2013 through 2018.

Given the location of switches, reclosers, and FCI, the CMI group weights will then be used to normalize the system-level baseline reliability data to compute the feeder-specific baseline reliability numbers (similar to those shown in Table 15). Other data from the PUC may be required, such as historical failure rates, repair time, and switching/isolation time and the probability of protective and switching devices to become "stuck" and fail to operate properly. The data will be input into CYME's reliability module to determine equipment placement that maximizes performance improvement.[19]

[17] IEEE P1885 guide provides practical methods for assessing, evaluating and verifying the benefits and impact of electric power demand, energy consumption and loss reduction of volt-var control optimization on electric power distribution systems.

[18] Refer to https://www.oeb.ca/utility-performance-and-monitoring/natural-gas-and-electricity-utility-yearbooks.

[19] This procedure is a little different than what was previously performed, where the following assumptions were used to guide the estimation process:

- The probability of fault occurrence in each zone is the same.
- All outage events are of the same duration.
- Pre-FDIR deployment: If it takes 100 minutes to restore service after a fault, it is assumed that 40 minutes is required to pinpoint the fault and 60 minutes is required to repair the fault

The theoretical reliability improvements will be calculated, which may be adjusted to reflect a more conservative approach as was previously performed. Table 15 shows the previously tabulated feeder-based reliability improvements (negative values indicate improvement) based upon data from 2008-2012 (excluding 2011), including an estimated change in customer outage minutes based on average CMI on a per feeder basis. The total estimated reduction in customer outage minutes is -206,515 minutes or 13.67%, or a reduction from 1,509,644 minutes to 1,303,128 minutes.

Table 15 PUC Feeder Reliability Data

FEEDER	SAIDI (MIN.)	CAIDI (MIN.)	SAIFI	POST FDIR SAIDI	POST FDIR CAIDI	POST FDIR SAIFI	DELTA SAIDI	DELTA CAIDI	DELTA SAIFI	AVE CMI	CHANGE IN CMI (MIN)
1-11	56	50	1.13	28	42	0.68	-50%	-84%	-60%	11120	-1779
1-12	113	50	2.25	57	43	1.35	-50%	-86%	-60%	34283	-4800
1-13	56	50	1.13	28	42	0.68	-50%	-84%	-60%	11882	-1901
1-14	56	50	1.13	28	42	0.68	-50%	-84%	-60%	11882	-1901
2-13	56	50	1.13	28	42	0.68	-50%	-84%	-60%	22394	-3583
2-14	56	50	1.13	28	42	0.68	-50%	-84%	-60%	18097	-2896
2-15	113	50	2.25	57	43	1.35	-50%	-86%	-60%	26724	-3741
2-16	56	50	1.13	28	42	0.68	-50%	-84%	-60%	16915	-2706
4-02	133	52	2.17							22990	
4-04										23923	
4-11										20826	
4-12										47898	
5-01										10036	
5-02										10036	
5-03										10036	
5-04										10036	
5-05										10036	
10-01											
10-02											
10-03											
11-11	113	50	2.25	57	43	1.35	-50%	-86%	-60%	21751	-3045
11-12	113	50	2.25	57	43	1.35	-50%	-86%	-60%	21238	-2973
11-13	233	50	4.66	117	43	2.80	-50%	-86%	-60%	59393	-8315
11-14	113	50	2.25	57	43	1.35	-50%	-86%	-60%	19651	-2751
12-11	113	50	2.25	57	43	1.35	-50%	-86%	-60%	30234	-4233
12-12	113	50	2.25	57	43	1.35	-50%	-86%	-60%	25499	-3570

- Post-FDIR deployment: For a feeder with two zones, it will take 20 minutes to pinpoint the fault in this example (50 percent less time). So, overall it is assumed that post-FDIR outage duration is 20 percent less than Pre-FDIR outage duration as the crews can locate faults more quickly with FDIR in place.

FEEDER	SAIDI (MIN.)	CAIDI (MIN.)	SAIFI	POST FDIR SAIDI	POST FDIR CAIDI	POST FDIR SAIFI	DELTA SAIDI	DELTA CAIDI	DELTA SAIFI	AVE CMI	CHANGE IN CMI (MIN)
12-13	113	50	2.25	57	43	1.35	-50%	-86%	-60%	4594	-643
12-14	113	50	2.25	57	43	1.35	-50%	-86%	-60%	22651	-3171
13-01	56	50	1.13	28	42	0.68	-50%	-84%	-60%	16874	-2700
13-02	113	50	2.25	57	43	1.35	-50%	-86%	-60%	23366	-3271
13-03	233	50	4.66	117	43	2.80	-50%	-86%	-60%	71427	-10000
13-04	56	50	1.13	28	42	0.68	-50%	-84%	-60%	16638	-2662
15-01	56	50	1.13	28	42	0.68	-50%	-84%	-60%	8149	-1304
15-02	56	50	1.13	28	42	0.68	-50%	-84%	-60%	4594	-735
15-03	56	50	1.13	28	42	0.68	-50%	-84%	-60%	4594	-735
15-04	56	50	1.13	28	42	0.68	-50%	-84%	-60%	4594	-735
16-01	113	50	2.25	57	4.3	1.35	-50%	-9%	-60%	32402	-29615
16-02	113	50	2.25	45	40	1.13	-40%	-80%	-50%	18038	-3608
16-03	113	50	2.25	45	40	1.13	-40%	-80%	-50%	25202	-5040
16-04	113	50	2.25	57	43	1.35	-50%	-86%	-60%	22404	-3137
18-01	402	50	8.04	161	40	4.02	-40%	-80%	-50%	85765	-17153
18-02	233	50	4.66	117	43	2.80	-50%	-86%	-60%	40478	-5667
18-03	233	50	4.66	117	43	2.80	-50%	-86%	-60%	44798	-6272
18-04	402	50	8.04	161	40	4.02	-40%	-80%	-50%	89525	-17905
19-01	233	50	4.66	233	50	4.66	-100%	-100%	-100%	41656	0
19-02	233	50	4.66	117	43	2.80	-50%	-86%	-60%	78029	-10924
19-03	233	93	2.51	94	74	1.26	-40%	-80%	-50%		
19-04	233	50	4.66	117	43	2.80	-50%	-86%	-60%	44016	-6162
20-01										22990	
20-02										28087	
20-03										36852	
20-04										33030	
21-01	233	50	4.66	117	43	2.80	-50%	-86%	-60%	41578	-5821
21-02	233	50	4.66	117	43	2.80	-50%	-86%	-60%	40315	-5644
21-03	233	50	4.66	117	43	2.80	-50%	-86%	-60%	47226	-6612
21-04	233	50	4.66	117	43	2.80	-50%	-86%	-60%	62892	-8805

Contractor views the reliability improvements shown in Table 15 as the upper limits of improvement given that actual reliability data is not known for each feeder. The U.S. Department of Energy (DOE) published the report "Reliability Improvements from the Application of Distribution Automation Technologies – Initial Results". The range of the reliability improvements from the report is shown in Table 16.

Table 16 DOE Published Reliability Improvements

YEAR	MINIUM	MAXIMUM
SAIFI	-11%	-49%
SAIDI	+4%	-56%
CAIDI	+29%	-15%

Comparing the published results in Table 16 to the estimates in Table 15 indicates that the estimates in Table 15 are generally at the maximum range for each improvement. Given that actual feeder reliability data is unknown and extrapolated from system data and that the values are slightly higher than published industry results, Contractor therefore concludes that the values shown in Table 15 are the theoretical upper limits of what can be achieved with the application of FDIR to those feeders.

VF3.3 Estimate Future FDIR and VVO Cost

This task will estimate the costs of implementing FDIR and VVO on each in-scope distribution feeder. This task will use the updated estimates to equipment counts provided from task VF2.1 Establish Feeder Zones and the established preferred vendors to develop an estimated cost for installation of FDIR and VVO on the in-scope distribution feeders.

VF3 Deliverables

1. Report that documents the existing and future reliability indices and estimated cost for FDIR implementation for each in-scope distribution feeder.
2. Report that documents the estimated future cost of FDIR.
3. Report that documents the estimated future VVO savings.

VF3 Reviews

The deliverables for task VF3 Future Reliability and Energy Savings Performance will be issued with one final review.

VF3 Assumptions

1. There are no specific assumptions for this task. Refer to General Assumptions.

VF4 Select Feeders (12/24/36/48)

This task will select what feeders will be implemented for FDIR, either 12, 24, 36, or 48. If the relatively poor reliability performance still exists for feeders serving the west and north part of the Sault Ste. Marie, these feeders could likely be a primary focus of FDIR design efforts. If it is still observed that the east Sault Ste. Marie feeders could benefit from automation, these could also be included. This task will also identify the feeders for the FDIR PoC, which will require coordination with the VVO PoC substation identified in VF2.1 Establish Feeder Zones .

VF4 Deliverables

1. Selection of feeders for FDIR implementation.

VF4 Reviews

No reviews are identified for task VF4 Select Feeders (12/24/36/48).

VF4 Assumptions

1. There are no specific assumptions for this task. Refer to General Assumptions.

VF5 Review Permits and Public Relations

This task will review all permitting and public relations requirements that will be performed in task EF3 Permits and Public Relations.

VF5.1 Local Permits

This task will confirm permitting requirements, processes, and timelines with the City of Sault Ste Marie, Ontario and other entities for construction, e.g., the installation of proposed equipment onto existing infrastructure within the public Right of Way (ROW) (including replacement of some wooden poles) and the lab facility (in coordination with task VO11 Review Lab Facility). The following may be reviewed for applicability:

1. Provincial, Federal or Tribal regulatory/environmental assessments or approvals, including related third-party studies.
2. Zoning or variances, or special permits/approvals other than a building/electrical and/or ROW permit and traffic permits or approvals from the City of Sault Ste Marie.
3. Zoning or permitting for replacement infrastructure beyond or in addition to standard permitting scope, if necessary.
4. Leasing, easements and pole attachment agreements, including negotiations, amendments and execution.
5. Floodplain, wetlands or storm water approvals and requirements.
6. Third party services, including outside counsel, experts, third party reviews, inspections or studies.
7. Municipal meetings and hearings.
8. Zoning, permitting, application, notice, filing, expediting and review fees.
9. Building/electrical, ROW, and traffic permits

This task will document the process flow for each type of permit required.

VF5.2 Develop Public Relations

This task will identify the necessary public relations such as attending neighborhood or community meetings and/or creating materials to support the meetings (e.g., presentation slides).

VF5 Deliverables

1. Assessment of permit requirements for installation of proposed equipment onto existing infrastructure within the public ROW, including replacement of wooden poles.
2. Approach for supporting neighborhood or community meetings.

VF5 Reviews

One final review is planned for the assessment of permit requirements and meeting approach (refer to Table 1).

VF5 Assumptions

1. There are no specific assumptions for this task. Refer to General Assumptions.

PUC Organizational Domain

This domain is related to the PUC's organizational structure and processes used to support the PUC's electric business. These major tasks in Step 1 identify the impacts of the SSG on the PUC's processes and organization.

VB1 Organizational Change

Accurate business processes are a fundamental element in effective implementation of complex and transformative technology such as being implemented by the SSG Project. All effective business implementation steps flow from sound and detailed business process design that is accomplished through the following tasks:

- VB1.1 Establish Business and Functionality Requirements
- VB1.2 Develop Use Case Requirements
- VB1.3 Review Roles, Skills, Training, and Organizational Change Needs
- VB1.4 Develop Communication Requirements
- VB1.5 Develop Process Transition, Phasing, and Migration Plans
- VB1.6 Assess Business Readiness

VB1.1 Establish Business and Functionality Requirements

Organization change assessment starts with a complete understanding of current and future business processes. Successful implementation of complex systems also requires clear knowledge of the transitional business and operational processes required to get from the As-Is to the To-Be state. This task will establish the business and functionality requirements to institute transformative ways of working, including the technical requirements that flow from these business and functional requirements. This task will identify existing business processes affected by and new business processes required by the SSG project implementation (e.g., the processes around CYME updates, refer to task EA1.3 CYME Integration). Workshops will be held with PUC stakeholders involved in the organization whose processes may be impacted by the SSG and also be supported by Survalent. We will develop a shared understanding of the SSG business and operational needs. Some topics may include:

- Outage management processes
- Switching orders management processes (planned, unplanned)
- Crew dispatch and filed crew management including relevant safety procedures
- Distribution network model management processes (GIS, CYME, ADMS network model)
- Distribution devices data management processes (Reclosers, IEDs, Fault Indicators, Sensors, etc.
- Integration of FDIR and OMS
- Integration of VVO into distribution operating practices and procedures
- IT integration services required for the in-scope business processes (AMI-OMS, AMI-CIS, ADMS-CYME, Customer Contact Center /IVR-OMS)
- Identification of key stakeholders, mapping of work processes (AS-IS, TO-BE), process monitoring, data analytics integration, skillsets, and best practices
- Discovery of other business processes and their existing documentation

Much of the information needed will be obtained via a series of interviews and discussions with the core team members of PUC. Some examples of the functional groups and required information are shown in Table 17.

Table 17 Examples of Required Information for Business Process and Organizational Change Management

FUNCTIONAL GROUP	TYPES OF INFORMATION
Operations Engineering System Planning Maintenance and Construction Communications IT OT Security Asset Management	1. Enterprise vision, goals and objectives 2. Strategic business plans and summaries of strategic initiatives 3. Long range (3-5 years) technology and/or organizational roadmaps 4. Planned capital projects 5. IT plans 6. Business processes 7. Job family descriptions 8. Organization charts 9. Prior analysis and business process models, if applicable 10. Organizational chart and overview of departmental responsibilities 11. Cost information work processes 12. Enterprise application architecture designs/diagrams 13. Data management process and requirements 14. Maintenance, disaster recovery and IT security plans 15. Business process definitions and flows 16. Recently completed internal technology assessments 17. Cyber and physical security documents 18. IT/information system standards, infrastructure, plans and costs (including implementation, and maintenance)

VB1.2 Develop Use Case Requirements

This task will develop the use case requirements to help ensure that required functional and performance capabilities will support the new business processes.

VB1.3 Review Roles, Skills, Training, and Organizational Change Needs

This task will review the training needs to support role changes, skill requirements, and organizational changes. Organizational change is a critical element of SSG project implementation that assures that the proposed solutions are implemented in a manner that mitigates the risks of change while providing a transition to the future business processes that unlock the value resulting from the implementation of the SSG. Mitigation takes shape via development of various training plans.

VB1.3.1 Develop Field Device Training Plan

This task will develop and review the field device training program (content, schedule, etc.) and assign PUC groups that need to attend each training session. The task will develop the conceptual training plan for all field devices (refer to Table 13). Note that some of the training plans may be only the provision of the vendor's standard training.

Operator/dispatcher training may include a system overview of how FDIR and VVO operate from the head end to the field (provided by Contractor), along with how the operators will use each device/system (standard vendor training services), such as:

- How to enable and disable controls

- Troubleshooting techniques

Engineer training may include how to implement and test new FDIR and VVO application scenarios with new devices, what adjustments are required to meet operational expectations, and troubleshooting techniques.

- How to use configuration software to create and maintain the current version of "as operated electrical distribution system" electrical network model
- How to enable and disable controls
- Troubleshooting techniques

Training materials will be developed in task EF1.5.1 Develop Field Device Training Materials and training will be performed in task EO2 Training.

VB1.3.2 Develop Cellular Training Plan

This task will develop and review the cellular equipment training program and assign PUC groups that need to attend each training session. Note that the training plan may be only the provision of the vendor's standard training.

Operator/dispatcher training may include a system overview of how the cellular equipment supports FDIR, VVO, and OMS systems (training provided by Contractor), along with how the operators will use each device/system (standard vendor training services), such as:

- How to use the software to operate and manage outages with the cellular equipment
- How to monitor the cellular equipment
- Troubleshooting techniques

Engineer training will include how to implement and test the cellular equipment, what adjustments are required to meet operational expectations, and troubleshooting techniques.

- How to use the software to operate and manage outages with the cellular equipment
- How to use configuration software to create and maintain the cellular equipment
- How to monitor the cellular equipment
- Troubleshooting techniques

Training materials will be developed in task EF1.5.2 Develop Cellular Training Materials and training will be performed in task EO2 Training.

VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans

This task will evaluate what training should be performed for IVR, ADMS, OMS, and VVO (e.g., before or after commissioning), when that training will be performed, and the training format (admins, operators, etc.) and the integrations (CYME, CIS, and AMI). This task must be completed before the start of task VP1.1 Quote Survalent Software. Training could address:

1. How to operate and maintain the OMS including the outage web portal and internal stakeholder dashboard
2. How to operate and maintain the ADMS, FDIR, and VVO
3. IVR interface, including how to maintain customer data and scripts within the IVR for customer communications functionality and how to operate, input and manage customer outage call data within the IVR for OMS functionality.
4. CYME, CIS, and AMI interfaces.

If additional training is required that is not part of standard training programs, this evaluation will include an assessment of the impact to project scope, schedule, or budget for PUC approval through task PM4 Change Management.

VB1.4 Develop Communication Requirements

This task will develop the communications requirements to impart change to those impacted by the new/changed processes.

VB1.5 Develop Process Transition, Phasing, and Migration Plans

This task will develop the process transition, phasing, and migration plans to effectively migrate from existing processes to new processes while mitigating the risks of change. The understanding and careful planning for interim "transitional states" is vital to the sustaining operational states that are inevitable on the path to the fully integrated solution. Any missing business process documentation will be identified and new process documentation or process map flows planned.

VB1.6 Assess Business Readiness

This task will assess business readiness and "go live" criteria. Business process transformation also drives the operational and business metrics that are needed to effectively manage the business. Development of these metrics and Service Level Agreements (SLAs), and the trending of these over time, is crucial to measurement of the solutions success and effectiveness in achieving expected benefits. While some SLAs may already be defined within the vendor contracts, the development and measurement of end-to-end business metrics and SLAs helps assure the PUC that it has achieved its complete business goals with these investments.

VB1 Deliverables

Deliverables provided by task VB1 Organizational Change are listed in Table 18.

Table 18 Task VB1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Organizational change management report.	VB1 Organizational Change	■	■	■	
2. Training plan for the field devices (refer to Table 13).	VB1.3.1 Develop Field Device Training Plan		■	■	
3. Training plan for the cellular equipment.	VB1.3.2 Develop Cellular Training Plan		■	■	
4. Evaluation of Survalent training content and training plan	VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans		■	■	

VB1 Reviews

Refer to Review Procedure.

VB1 Assumptions

1. This task will conduct/lead a two-day workshop with PUC employees over the course of one site trip (or virtual).
2. The PUC will provide experienced resources who can provide input on PUC training requirements.

Step 1 Procurement

VP1 QUOTE MAJOR MATERIALS AND EQUIPMENT

This task will initiate the procurement process that will be continued in task PR1 Major Materials and Equipment. This task will initiate the procurement process that follows the project's procurement plan to quote major materials, equipment, and training (refer to task EO2 Training) for the following procurements:

1. PR1.1 Purchase Survalent Software
2. PR1.2 Purchase Field Equipment
3. PR1.3 Purchase Cellular Equipment
4. PR1.4 Purchase IVR Software
5. PR1.5 Purchase Server Hardware

The project procurement plan includes bid review, followed by the development of firm pricing, PUC review, and then finalization of price and contract followed by award. The project procurement plan will be followed for all procurement of major materials and equipment.

This task will be coordinated with the task VF3.3 Estimate Future FDIR and VVO Cost that estimates the future FDIR cost. Major equipment will be ordered to meet the Ontario Regulation 22/04.

VP1.1 Quote Survalent Software

This task will work with Survalent to quote the identified software, options, and training. This task will track and manage the purchase of all software procured from Survalent. This task must only start after the completion of tasks VO2 Survalent Reporting, VO3.2 CIS Report, VO5 Evaluate ADMS and VVO Options, VO6 Identify the Virtual Server Requirements, VO7 Evaluate Cybersecurity, VO8.2 Prepare IVR Integration Report, VO9.2 Prepare CYME Integration Report, VO10 Review Enhanced CSR/Customer Toolset, VO12.2 AMI Integration Report, and VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans.

VP1.2 Quote Cellular Equipment

This task will track and manage the purchase of cellular equipment, if required. This task includes in the quote provision of the vendor's standard set of documentation (e.g., user's guide, installation guide, operator guide) and training as defined in task VB1.3.2 Develop Cellular Training Plan.

VP1.3 Quote Field Equipment

This task will track and manage the purchase of field equipment shown in Table 12 and Table 13. This task includes in the quote provision of the vendor's standard set of documentation (e.g., user's guide, installation guide, operator guide) and training as defined in task VB1.3.1 Develop Field Device Training Plan.

VP1.4 Quote IVR Software

This task will track and manage the purchase of the IVR software. This task also provides the vendor's standard set of documentation, such as user's guide, installation guide, operator guide, etc.

VP1.5 Quote Server Hardware

This task will track and manage the purchase of the server hardware identified in task VO6 Identify the Virtual Server Requirements.

VP1 Deliverables

1. Copies of all quotes.

VP1 Reviews

The deliverables for task VP1 Quote Major Materials and Equipment will be issued without any planned reviews.

VP1 Assumptions

1. The PUC will implement the necessary cellular service contracts for the GridAdvisor field device communications (refer to Table 13) so the devices can provide the required SCADA data.[20] The PUC will be responsible for the data plans, service level agreement, and contractual agreements, including all supporting head-end network infrastructure and configuration to enable TCP/IP ping-able path from the Survalent ADMS to the GridAdvisor devices.
2. Selected equipment will meet the performance, cybersecurity, and other requirements for all applications being supported.

VP2 ESTABLISH MATERIAL MANAGEMENT REQUIREMENTS

This task will report on the inventory and warehouse requirements for the material management, such as:

- Access control for authorized persons only.
- Documentation for withdrawal of materials and equipment from the warehouse.
- Service counters for presenting, processing documents.
- Loading/unloading docks.
- Equipping with fire extinguishers and storage racks.

[20] Eaton will provide a list of Mobile Equipment Identification (MEID) numbers for the devices purchased with cellular communications. The PUC will provide these numbers to their cellular service provider to establish cellular service contracts using a private VPN service involving machine-to-machine communications. A VPN service is required so that the field devices are not directly accessible from the public internet. The PUC should also understand the cellular plan rates are impacted by data update rates and any other access attempts.

- Designating spaces for subcontractor use.

VP2 Deliverables

1. Documentation of inventory and warehouse requirements that are incorporated into the procurement plan.

VP2 Reviews

The deliverables for this task will be issued with only a final review.

VP2 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

Step 2 Engineering

PUC OPERATIONAL DOMAIN

The engineering across the PUC operational domain will prioritize the completion of tasks related to a PoC for VVO and FDIR on a single substation (refer to task VF2.1 Establish Feeder Zones) and its associated feeders (refer to task VF4 Select Feeders (12/24/36/48)). Refer to CN1.3 Create Commissioning Plan.

The PUC operational domain has the following major tasks:

1. System integration in task EA1 System Integration.
2. The implementation of the Survalent OMS in task EA2 OMS.
3. The implementation of the Survalent ADMS in task EA3 ADMS.
4. The upgrade of the Survalent SCADA in task EA4 SCADA Master.
5. The implementation of the IVR solution in task EA5 IVR.
6. The development of the cut-over plan in task EA6 Develop Cut-Over Plan.
7. Implementation of a lab facility in task EA7 Lab Facility.

EA1 System Integration

This task performs the following tasks:

- EA1.1 IVR Integration
- EA1.2 CIS Integration
- EA1.3 CYME Integration
- EA1.4 AMI Integration

This task will be coordinated with the following design activities:

- EA2 OMS
- EA3 ADMS
- EA4 SCADA Master
- EA5 IVR
- EA6 Develop Cut-Over Plan

EA1.1 IVR Integration

The IVR integration will allow the OMS to receive outage call records from the IVR. The OMS will analyze these call records to predict the locations of the outages. When a predicted outage location is verified, the case information, including estimated time of restoration, is transmitted back to the IVR, which can use this data when handling subsequent customer calls. When the outage is restored, the dispatcher can, via this interface, forward callback requests to the IVR. Coordination of this task with the PoC is not required.

EA1.1.1 Design IVR Integration

Once the data integration requirements are formalized from task VO8.2 Prepare IVR Integration Report, the IVR integration design will begin with a workshop, continue with the creation of a design report, and finish with the detailed design.

This task will perform the detailed design of the ADMS-IVR interface by Survalent and Milsoft based upon the interface report. Delivery of design documentation will be from Survalent and Milsoft.

EA1.1.2 Develop IVR Integration Software Testing Plan

This task will develop the software testing plan (refer to **Software Testing Plan**) for the IVR integration, which will be addressed in Milsoft's factory acceptance testing plan (refer to task EA5.4 Develop IVR Software Testing Plan).

EA1.1.3 Develop IVR Integration Training Materials

This task will develop the MultiSpeak IVR interface training materials from Survalent and Milsoft. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA1.1.4 Develop IVR Integration Maintenance Plan

This task will develop the IVR interface maintenance plan from Survalent and Milsoft.

EA1.2 CIS Integration

The CIS integration will be via a flat file using the tasks detailed in this section. These CIS integration tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

EA1.2.1 Design CIS Integration

Once the data integration requirements are formalized from task VO3.2 CIS Report, this task will perform the detailed design of the ADMS-CIS flat file format by Survalent and Harris NorthStar. Delivery of design documentation will be from Survalent and Harris NorthStar.

EA1.2.2 Develop CIS Integration Software Testing Plan

This task will develop the software testing plan for the CIS integration (refer to **Software Testing Plan**), which relies on the delivery of testing plan from Survalent and Harris NorthStar.

EA1.2.3 Develop CIS Integration Training Materials

This task will develop the CIS interface training materials from Survalent and Harris NorthStar. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA1.2.4 Develop CIS Integration Maintenance Plan

This task will develop the CIS interface maintenance plan from Survalent and Harris NorthStar.

EA1.3 CYME Integration

This task will use the CYME model to establish a primary connectivity model in the ADMS and OMS systems. This task also leverages the customer to transformer information from the CIS integration and utilizes an import of the existing SCADA database to associate existing SCADA points to the new connectivity model. These CYME integration tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

EA1.3.1 Design CYME Integration

Once the data integration requirements are formalized in task VO9.2 Prepare CYME Integration Report, this task will perform the detailed design of the CYME interface. This task will also:

1. Import the PUC's provided CYME data files and then:
    a. Analyze the CYME files
    b. Report any issues or errors found with the CYME data (should be minimal based upon work performed in task VO1 Update CYME Model and VO9 CYME)
    c. Import the connectivity model into Survalent database and Graphical User Interface (GUI)
    d. Import the service territory map (DWG or DXF format)
    e. Overlay the connectivity model with the service territory map
2. Optimize the maps by:
    f. Geographically correcting placement of substations and associated single line diagrams (SLDs).
    g. Implementing System Configuration Status (SCS) in the substation SLDs so that substations are included in the connectivity model.
    h. Connecting substations to the connectivity model (feeder) outside of the substation.
    i. Validating connectivity.
    j. Optimizing the overall view and associated substation views.

EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)

This task will develop the software testing plan for the CYME integration. Because the import is expected to be one time, a software testing plan is not expected.

EA1.3.3 Develop CYME Integration Training Materials

This task will develop the CYME integration training materials from Survalent. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA1.3.4 Develop CYME Integration Maintenance Plan

This task will develop the CYME integration maintenance plan. Since the CYME integration is a one-time import of the CYME model, this maintenance plan will likely address the maintenance of the electrical model in the ADMS and in CYME.

EA1.4 AMI Integration

This task will design the MultiSpeak interface between the Survalent ADMS and the Sensus AMI so that the AMI system provides the data required by the ADMS in support of the provided applications (VVO).

These AMI integration tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

EA1.4.1 Design AMI Integration

Once the data integration requirements are formalized in task VO12.2 AMI Integration Report, this task will finalize the bellwether meters and design the AMI interface.

EA1.4.1.1 Finalize Bellwether Meter Selection

This task will finalize the bellwether meter selection from Step 1 Engineering (refer to task VF2.2 Establish Bellwether Locations).

EA1.4.1.2 Design AMI Interface

This task will perform the detailed design of the ADMS-AMI interface by Survalent and Sensus based upon the interface requirements document from Step 1 task VO12 AMI Integration. Delivery of design documentation will be from Survalent and Sensus.

EA1.4.2 Develop AMI Integration Software Testing Plan

This task will develop the software testing plan for the AMI integration (refer to **Software Testing Plan**), which relies on the delivery of testing plan from Survalent and Sensus.

EA1.4.3 Develop AMI Integration Training Materials

This task will develop the MultiSpeak AMI interface training materials from Survalent and Sensus. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA1.4.4 Develop AMI Integration Maintenance Plan

This task will develop the MultiSpeak AMI interface maintenance plan from Survalent and Sensus.

EA1 Deliverables

Deliverables provided by task EA1 System Integration are listed in Table 19.

Table 19 Task EA1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. IVR integration software testing plan.	EA1.1.2 Develop IVR Integration Software Testing Plan		■	■	
2. IVR integration training materials.	EA1.1.3 Develop IVR Integration Training Materials		■	■	
3. IVR integration maintenance plan.	EA1.1.4 Develop IVR Integration Maintenance Plan		■	■	
4. CIS integration software testing plan.	EA1.2.2 Develop CIS Integration Software Testing Plan		■	■	
5. CIS integration training materials.	EA1.2.3 Develop CIS Integration Training Materials		■	■	
6. CIS integration maintenance plan.	EA1.2.4 Develop CIS Integration Maintenance Plan		■	■	
7. CYME integration software testing plan (placeholder, not a deliverable at this time)	EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)				
8. CYME integration training materials.	EA1.3.3 Develop CYME Integration Training Materials		■	■	
9. CYME integration maintenance plan.	EA1.3.4 Develop CYME Integration Maintenance Plan		■	■	
10. AMI integration report.	EA1.4.1 Design AMI Integration		■	■	
11. Bellwether meter report.	EA1.4.1.1 Finalize Bellwether Meter Selection		■	■	■
12. AMI integration design deliverables.	EA1.4.1.2 Design AMI Interface		■	■	
13. AMI integration software testing plan.	EA1.4.2 Develop AMI Integration Software Testing Plan		■	■	
14. AMI integration training materials.	EA1.4.3 Develop AMI Integration Training Materials		■	■	

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
15. AMI integration maintenance plan.	EA1.4.4 Develop AMI Integration Maintenance Plan		■	■	

EA1 Reviews

Refer to Review Procedure.

EA1 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EA2 OMS

In coordination with the task EA1 System Integration and based upon the output from task VO5 Evaluate ADMS and VVO Options, this task will design the OMS system to support:

- OMS functionality (refer to task EA2.1 Design OMS)
- Customer Outage Web Portal (refer to task EA2.2 Design Customer Outage Web Portal)
- Internal stakeholder dashboard (refer to task EA2.3 Design Internal Stakeholder Dashboard)
- Crew management (refer to task EA2.4 Design Mobile Crew)

This task will also create the following plans:

- Software testing (refer to task EA2.5 Develop OMS Software Testing Plan)
- Training (refer to task EA2.6 Develop OMS Training Materials)
- Maintenance (refer to task EA2.7 Develop OMS Maintenance Plan)

The OMS will:

- Reduce outage durations due to faster restoration based upon outage location predictions.
- Reduce outage duration averages due to prioritizing
- Improve media relations by providing accurate outage & restoration information.
- Reduce complaints to regulators due to ability to prioritize restoration of emergency and other critical customers.
- Reduce outage frequency due to use of outage statistics for making targeted reliability improvements.
- Fast track of problem location by meter ping analysis with AMI interface

Coordination of these tasks with the PoC is not required.

EA2.1 Design OMS

This task will design the OMS to support the following capabilities:

- Automated data entry
- Call analysis
- Callbacks
- SmartVU management
- Switch order and clearances
- SCADA event and operations

Note that the following tasks will coordinate the OMS integration with the OMS design:

- EA1.1 IVR Integration
- EA1.2 CIS Integration

- EA1.3 CYME Integration
- EA1.4 AMI Integration

The deliverable will be documentation indicating the designed functionality.

EA2.2 Design Customer Outage Web Portal

This task will design and document the standard outage web portal provided by Survalent, including configuration of default options and user access control for the customer outage web portal that will allow the PUC's customers to:

- View outage locations and the extent of existing outage cases
- View outage ticket information such as cause, estimated time of restoration and outage messages
- Submit outage reports
- View a list of all planned outages

EA2.3 Design Internal Stakeholder Dashboard

This task will design and document the internal stakeholder dashboard.

EA2.4 Design Mobile Crew

This task will perform the design of the Mobile Crew (MC) client. MC client is a tablet-oriented web application is used by field crews. When provided, the MC client will show a map of the service area using OpenStreet Map. It will display primary line sections and transformers and meters in the map. It will not display substations. No SCADA operations (e.g. open/close) will be supported. The dispatcher will be able to send a text message to the crew members to notify them of a change in work.

MC will show two panels that a crew member will be able to navigate. The first is a case list that shows details of outage cases and is mostly view-only; however, it will be possible for the crews to modify the cause code, estimated time of restoration, and notes. The second panel is the work list that displays all of the work items that are assigned to a crew, which crew members will be able to make modifications to work items (e.g., work status, completion time, material use).

EA2.5 Develop OMS Software Testing Plan

This task will develop the software testing plan for the OMS (refer to **Software Testing Plan**), which relies on the delivery of the testing plan from Survalent.

EA2.6 Develop OMS Training Materials

The task will develop and review the training materials for the OMS based upon the training plan developed in task VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA2.7 Develop OMS Maintenance Plan

The task will develop and review the training program, assign PUC groups that need to attend each training session, and develop the training deliverables for the following;

1. OMS.
2. IVR interface.
3. CIS interface.

4. Outage web portal.
5. Internal Stakeholder Dashboard.

EA2 Deliverables

Deliverables provided by task EA2 OMS are listed in Table 20.

Table 20 Task EA2 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. OMS design document.	EA2.1 Design OMS		■	■	
2. Outage web portal design document.	EA2.2 Design Customer Outage Web Portal		■	■	
3. Internal stakeholder dashboard design document.	EA2.3 Design Internal Stakeholder Dashboard		■	■	
4. Mobile crew design document.	EA2.4 Design Mobile Crew		■	■	
5. OMS testing plan.	EA2.5 Develop OMS Software Testing Plan		■	■	
6. OMS training materials.	EA2.6 Develop OMS Training Materials		■	■	
7. OMS maintenance plan.	EA2.7 Develop OMS Maintenance Plan		■	■	

EA2 Reviews

Refer to Review Procedure.

EA2 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EA3 ADMS

In coordination with the task EA1 System Integration and based upon the output from task VO5 Evaluate ADMS and VVO Options, this task will design the Survalent ADMS to support:

- FDIR for the number of locations shown in Table 12 on distribution.
- VVO for the number of feeders shown in Table 12.
- FDIR for the sub-transmission system.

This task includes the following tasks:

- EA3.1 Define DNP3 Design Templates
- EA3.2 Develop ADMS Symbol Templates
- EA3.3 Additional Templates

These ADMS design tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan). Refer to task CN1.3 Create Commissioning Plan.

EA3.1 Define DNP3 Design Templates

This task will establish the standard templates for DNP3 settings and polling schemes required to support VVO and FDIR, leveraging the templates for network settings created from task EA4.1 Define SCADA Master Logical Design. This task will also be coordinated with task EA3.3.1 Define Device Template Point Lists.

EA3.2 Develop ADMS Symbol Templates

This task will use the output of task VO5 Evaluate ADMS and VVO Options to develop the symbol templates to meet the PUC's requirements for the major electrical equipment being installed in the field as listed in Table 12 and detailed in Table 13. These graphics and symbol templates will be used as required to support the tasks described in EA1.3 CYME Integration, EA3.3.1 Define Device Template Point Lists, and EA4.2 Create SCADA Master Displays and Database.

EA3.3 Additional Templates

This task will build upon the initial templates developed in task VF2.3 Standardized Field Equipment Designs.

EA3.3.1 Define Device Template Point Lists

Using the symbol templates developed in task EA3.2 Develop ADMS Symbol Templates, this task will define for the field devices (refer to Table 13) a template DNP3 point lists that includes all points required to support FDIR, and VVO and assess whether they are available from the field devices. This task is coordinated with the development of the related and required substation points in task VO4 Evaluate SCADA Data and also coordinated with the DNP3 settings defined in task EA3.1 Define DNP3 Design Templates.

EA3.3.2 Field Device Template Configurations

This task will create design template configurations (or construction standards) required for the field devices.

EA3.3.2.1 Create Field Device Template Configurations

This task will develop the template configuration files required for the controllers associated with the field equipment (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, and FCI; refer to Table 13)[21]. These templates will be used to develop the site-specific configurations in task EF1 Detailed Design for Field Equipment.

This task depends upon the approval of the point list templates from task EA3.3.1 Define Device Template Point Lists.

EA3.3.2.2 Create Cellular Template Configuration

This task will develop the template configuration files required for the cellular equipment. This template will be used to develop the site-specific configurations in task EF1 Detailed Design for Field Equipment.

EA3.3.3 Field Equipment Template Testing Plans

This task will develop the template testing plans for the field equipment (including the associated cellular equipment). Coordination with the field equipment vendors is expected.

EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment

This task will develop template component testing plan (refer to Component Testing Plan) for the field equipment having electrical or mechanical components (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, and capacitor bank; refer to Table 13). FCI are not included because the FCI does not have a mechanical or electrical operation.

EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans

This task will develop template application testing plan (refer to **Application Testing Plan**) for:

1. FDIR.
2. VVO.

EA3.3.3.3 Develop Template Cellular Testing Plan

This task will develop template testing plan for the cellular equipment in the field (refer to **Cellular Testing Plan**). This will only locally test the cellular equipment in the field with that located at the PUC headend and include documentation that the cellular equipment does not pose a public health concern. The PUC will configure and test the PUC's communication connectivity connecting to the cellular provider as identified in this testing plan.

EA3.3.3.4 Develop Template Communications End-to-End Testing Plan

This task will develop template communications end-to-end testing plan associated with the field devices and substations (refer to **Communications End-to-End Testing Plan**) for the cellular communications.

[21] For example, FCI use ProView NXG software will be used to create the configuration, which is typically downloaded to the FCI using a Bluetooth connection and prior to the FCI being installed.

EA3 Deliverables

Deliverables provided by task EA3 ADMS are listed in Table 21.

Table 21 Task EA3 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Standard DNP3 setting and polling scheme setting templates.	EA3.1 Define DNP3 Design Templates		■	■	
2. Standard graphics and symbols.	EA3.2 Develop ADMS Symbol Templates		■	■	
3. Standard point list templates for FDIR and VVO application devices (refer to Table 13).	EA3.3.1 Define Device Template Point Lists		■	■	
4. Template configuration files for the field devices (refer to Table 13).	EA3.3.2.1 Create Field Device Template Configurations		■	■	
5. Template configuration files for the cellular equipment.	EA3.3.2.2 Create Cellular Template Configuration		■	■	
6. Template testing plan for the field devices (refer to Table 13).	EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment		■	■	
7. Template application testing plan for the FDIR and VVO applications.	EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans		■	■	
8. Template cellular testing plan for the cellular equipment.	EA3.3.3.3 Develop Template Cellular Testing Plan		■	■	
9. Template communications end-to-end testing plan for testing the communications supported by the cellular equipment.	EA3.3.3.4 Develop Template Communications End-to-End Testing Plan		■	■	

EA3 Reviews

Refer to Review Procedure.

EA3 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EA4 SCADA Master

In coordination with the task EA1 System Integration, this task will design the upgrade to the Survalent SCADA with ADMS applications. These SCADA master design tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

EA4.1 Define SCADA Master Logical Design

This task will define and document the TCP/IP network addressing and related settings to establish the basic TCP/IP network connectivity for the added devices and hardware. These settings will be provided by the PUC and will support the task EA3.1 Define DNP3 Design Templates.

EA4.2 Create SCADA Master Displays and Database

This task will create the ADMS displays for FDIR and VVO applications based upon the standards developed in task EA3.2 Develop ADMS Symbol Templates. The deliverable will be screen shots of the created displays for PUC review.

This task will develop the ADMS database for adding support for FDIR and VVO applications based upon the template point lists created in task EA3.3.1 Define Device Template Point Lists. The deliverable will be an export of the database.

EA4.3 Develop SCADA Master End-to-End Testing Plan

This task will develop the SCADA end-to-end testing plan and is coordinated with task EA3.3.3 Field Equipment Template Testing Plans. Refer to **SCADA End-to-End Testing Plan** for a description of this testing plan.

EA4.4 Develop SCADA and ADMS Software Testing Plan

This task will perform the design of SCADA and ADMS testing plan (including the balance of ADMS functionality not already covered in the application testing). This test plan will be used when migrating from the existing SCADA environment to the new ADMS environment in task CO1 Migrate SCADA to ADMS Server.

EA4.5 Develop SCADA and ADMS Master Training Materials

This task will perform the design of SCADA master training materials (including the balance of ADMS functionality not already covered in the application training). This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA4.6 Develop SCADA and ADMS Master Maintenance Plan

This task will perform the design of SCADA master maintenance plan (including the balance of ADMS functionality not already covered in the application training).

EA4 Deliverables

Deliverables provided by task EA4 SCADA Master are listed in Table 22.

Table 22 Task EA4 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Logical design.	EA4.1 Define SCADA Master Logical Design		■	■	■
2. Screenshots of displays.	EA4.2 Create SCADA Master Displays and Database	■	■	■	■
3. Database exports.	EA4.2 Create SCADA Master Displays and Database	■	■	■	■
4. SCADA master end-to-end testing plan.	EA4.3 Develop SCADA Master End-to-End Testing Plan		■	■	
5. SCADA master and ADMS testing plan.	EA4.4 Develop SCADA and ADMS Software Testing Plan		■	■	
6. SCADA master and ADMS training materials.	EA4.5 Develop SCADA and ADMS Master Training Materials		■	■	
7. SCADA master and ADMS maintenance plan.	EA4.6 Develop SCADA and ADMS Master Maintenance Plan		■	■	

EA4 Reviews

Refer to Review Procedure.

EA4 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EA5 IVR

In coordination with the task EA1 System Integration, this task will design the IVR system from the output of task VO8.2 Prepare IVR Integration Report. These IVR design tasks will not require coordination with the PoC.

EA5.1 Define IVR Logical Design

This task will define and document the TCP/IP network addressing and related settings to establish the basic TCP/IP network connectivity to the hosted IVR solution. These settings will be implemented by the PUC.

EA5.2 Develop IVR Integration

This task will develop the detailed configuration for the ADMS and OMS integration with the IVR based upon the standard MultiSpeak protocol communication.

EA5.3 Perform IVR Configuration

This task will create the IVR configuration.

EA5.4 Develop IVR Software Testing Plan

This task will develop the IVR software testing plan (refer to **Software Testing Plan**), which relies on the delivery of factory acceptance testing (FAT) plan from Milsoft (if included with a hosted solution) that will also include IVR integration testing (refer to EA1.1.2 Develop IVR Integration Software Testing Plan). Note that since Milsoft is a hosted solution, the lab testing plan (refer to task EA7.2 Create Lab Testing Plan) includes any IVR FAT instead of performing testing in the lab. This testing plan also includes the site acceptance test plan to support the IVR go-live. This testing is performed in task CO5 Perform IVR Go-Live.

EA5.5 Develop IVR Training Materials

This task will develop the IVR training materials. This task will be coordinated with task EO1.3 Conduct Workshops. Training will be performed in task EO2 Training.

EA5.6 Develop IVR Maintenance Plan

This task will develop the IVR maintenance plan.

EA5 Deliverables

Deliverables provided by task EA5 IVR are listed in Table 23.

Table 23 Task EA5 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Logical design.	EA5.1 Define IVR Logical Design		■	■	■
2. Integration settings.	EA5.2 Develop IVR Integration		■	■	■
3. IVR configuration.	EA5.3 Perform IVR Configuration	■	■	■	■
4. IVR software testing plan.	EA5.4 Develop IVR Software Testing Plan		■	■	
5. IVR training materials.	EA5.5 Develop IVR Training Materials		■	■	
6. IVR maintenance plan.	EA5.6 Develop IVR Maintenance Plan		■	■	

EA5 Reviews

Refer to Review Procedure.

EA5 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

EA6 Develop Cut-Over Plan

This task will develop the cut-over plan that describes the process of cut-over from the test system to the production system via publishing that will be performed in task CO4 Cut-Over from Test System to Production System. The cut-over plan contents will have the same structure as the testing plan (refer to **Testing Plan Structure**), with the addition of steps that specify items such as the following:

1. The cut-over sequence that specifies the steps required to perform the cut-over
2. Fallback procedures in case issues are encountered during the cut-over sequence
3. How normal operations is restored

The development of the cut-over plan will be coordinated with the development of the commissioning plan and with the PoC. Refer to task CN1.3 Create Commissioning Plan.

EA6 Deliverables

Deliverables provided by task EA6 Develop Cut-Over Plan are listed in Table 24.

Table 24 Task EA6 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Cut-over plan for test system cut-over to production system.	EA6 Develop Cut-Over Plan		■	■	

EA6 Reviews

Refer to Review Procedure.

EA6 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EA7 Lab Facility

This task will develop the design for the lab facility and create the lab testing plan based upon output from task VO11 Review Lab Facility. These tasks are coordinated with task PR3 Establish and Manage Inventory and Warehouse and the PoC (refer to CN1.3 Create Commissioning Plan).

EA7.1 Design Lab Facility and Test System

The lab facility and test system support testing of new database points, graphics, protocols, and provided applications in the SSG. This task will design the lab facility that incorporates the test system based upon the output from task VO11 Review Lab Facility. The test system design will be coordinated with and may leverage the template deliverables from task VF2.3 Standardized Field Equipment Designs to create a set of installation drawings for the lab facility. The design will utilize a test server license (refer to task VO6 Identify the Virtual Server Requirements) that will be installed on new virtual server(s) as part of the overall installation in task ST1.1 Install the Lab Test System.

EA7.2 Create Lab Testing Plan

This task will create the lab testing plan as early in the project as possible and in coordination with the creation of the Commissioning Plan (refer to task CN1.3 Create Commissioning Plan and Figure 2). The lab testing plan defines what testing plans will be executed at the lab facility. The objective of the lab testing is to confirm the complete functionality of the delivered SSG systems (ADMS and OMS) and their applications (FDIR and VVO applications) being supported by cellular communications integrated into existing communications and the installation of new devices (refer to Table 13). The lab testing plan will have tasks that execute the various testing plans shown in Table 25. Lab testing will utilize the test system and may include field equipment and radios installed in a lab facility setting.

The lab testing plan will first test the applications and then test the remaining feeders as they are made ready for construction. Lab testing is completed on the new equipment to test those configurations before the equipment is shipped to the field for construction. One result is that any equipment that requires a configuration file will be shipped to the field with its configuration loaded and tested, so there is no need to load the configuration during construction and/or commissioning.

Table 25 Lab Testing Tasks

TASK DESCRIPTION	TESTING PLAN CREATION	PREREQUISITE LAB TESTING TASKS
1. Cellular field tests.	EA3.3.3.3 Develop Template Cellular Testing Plan	N/A, lab construction
2. Communications end-to-end test.	EA3.3.3.4 Develop Template Communications End-to-End Testing Plan	2
3. Field tests for field equipment.	EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment	3
4. SCADA master end-to-end test.	EA4.3 Develop SCADA Master End-to-End Testing Plan	4
5. Software tests for the required CYME integration.	EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)	N/A
6. FDIR application test.	EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans	5, 6
7. Software tests for the required CIS integration.	EA1.2.2 Develop CIS Integration Software Testing Plan	N/A
8. Software tests for the required AMI integration.	EA1.4.2 Develop AMI Integration Software Testing Plan	N/A
9. VVO application test.	EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans	5, 6, 8, 9
10. Software tests for SCADA and ADMS covering the balance of functionality not already tested.	EA4.4 Develop SCADA and ADMS Software Testing Plan	5
11. Software tests for OMS covering the balance of functionality not already tested.	EA2.5 Develop OMS Software Testing Plan	12
12. IVR FAT with IVR integration testing.	EA1.1.2 Develop IVR Integration Software Testing Plan	Coordinated with 12

EA7 Deliverables

Deliverables provided by task EA7 Lab Facility are listed in Table 26.

Table 26 Task EA7 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Modified or new drawings.	EA7.1 Design Lab Facility and Test System				
k. System/communication block diagram		■	■	■	■
l. Equipment layout drawing showing all of the equipment locations for the lab.			■	■	■
m. Equipment layout detail drawings showing power connection, communication connections, etc.			■	■	■
2. Completed lab testing plan.	EA7.2 Create Lab Testing Plan		■	■	

EA7 Reviews

Refer to Review Procedure.

EA7 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

PUC SUBSTATION DOMAIN (PLACEHOLDER)

This is a placeholder for substation engineering work that may become required when substation transformers are replaced with LTC transformers. When these sites are identified in task VF2.5 Conduct Field Survey, those changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management and added here as required during Step 1.

PUC FIELD DOMAIN

All of the PUC field domain tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

EF1 Detailed Design for Field Equipment

This task will perform the detailed design for the selected field locations for each feeder based upon the completed work in VF2.5 Conduct Field Survey. Changes will be evaluated for impacts on scope, schedule, and budget per task PM4 Change Management.

EF1.1 Create Site-Specific Work Orders

This task will develop the detailed design for each site-specific location based upon output from Task VF2.5 Conduct Field Survey and using the standards developed in task VF2.3 Standardized Field Equipment Designs to create a complete work order for each location. A complete work order package may include as appropriate for the field location (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, and FCI; refer to Table 13):

1. A GIS-based sketch of the work location and other drawings as necessary, such as:
    n. Communication block diagram
    o. Rack/cabinet/pole layout drawing example or standard
    p. Rack/cabinet/pole wiring drawing example or standard
    q. AC and/or DC schematic
    r. Data flow diagram
2. Engineering design for the installation and removal, plus any re-use (e.g., new or reuse existing pole), including any engineering analysis for each pole location involved, will be performed to meet the Ontario Regulation 22/04.
3. Notes pertinent to construction, permits, and testing.
4. Required permits.
5. Tree trimming. Requirements for tree trimming will be identified on the work order.
6. AC power.
7. A BOM that is adapted from the BOM developed in task VF2.3 Standardized Field Equipment Designs so that the BOM becomes site-specific and describes all materials required at each specific work location.

The design will be finalized for permitting at the final design review stage and coordinated as required with task EF3 Permits and Public Relations.

EF1.2 Perform Protection Coordination Studies

This task will perform the protection coordination analysis for each recloser and switch site to develop appropriate protection settings with protective relay coordination curves based upon the standard protection schemes developed in VF2.3.2 Create Standard Feeder Protection Schemes. These protection settings will be used in task EF1.3 Create Configuration Files.

EF1.3 Create Configuration Files

This task will create the configuration files for all controllers and cellular equipment installed at each location included in the work order, based upon the templates developed in task EA3.3.2 Field Device Template Configurations. All configurations (reclosers and switches) will be ready for download to the controller and include the proper protection settings developed in task EF1.2 Perform Protection Coordination Studies.

EF1.4 Create Component Testing Plans

This task will create site-specific component testing plans (refer to Component Testing Plan) based upon the templates developed in task EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment.

EF1.5 Create Field Equipment Training Materials

This task will create training materials for the field devices and cellular equipment.

EF1.5.1 Develop Field Device Training Materials

The task will develop and review the training materials for the field devices (refer to Table 13). Materials will be developed based upon the concepts developed in task VB1.3.1 Develop Field Device Training Plan. Note that some of the training materials may be only the provision of the vendor's standard training materials. Training will be performed in task EO2 Training.

EF1.5.2 Develop Cellular Training Materials

The task will develop and review the training materials for the cellular equipment. Materials will be developed based upon the concepts developed in task VB1.3.2 Develop Cellular Training Plan. Note that the training materials may be only the provision of the vendor's standard training materials. Training will be performed in task EO2 Training.

EF1 Deliverables

Deliverables provided by task EF1 Detailed Design for Field Equipment are listed in Table 27.

Table 27 Task EF1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Complete work order package for each site location.	EF1.1 Create Site-Specific Work Orders		■	■	■
2. Protection settings for each site location.	EF1.2 Perform Protection Coordination Studies		■	■	■
3. Configuration settings for each site location.	EF1.3 Create Configuration Files		■	■	■
4. Test plans for each site location.	EF1.4 Create Component Testing Plans		■	■	■
5. Training materials for field devices.	EF1.5.1 Develop Field Device Training Materials		■	■	■
6. Training materials for cellular equipment.	EF1.5.2 Develop Cellular Training Materials		■	■	■

EF1 Reviews

Refer to Review Procedure.

EF1 Assumptions

1. Distribution system protection analysis will limit its coordination to one mainline device up and one mainline device downstream of recloser devices.
2. All permitting is complete prior to the work order being released IFC.
3. The PUC will provide all required substation protective relay setting files.

EF2 Design Field Area Network

This task will design the field area network using cellular communications to devices supporting FDIR and VVO applications.

EF2 Deliverables

Deliverables provided by task EF2 Design Field Area Network are listed in Table 28.

Table 28 Task EF2 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Field area network design report.	EF2 Design Field Area Network		■	■	

EF2 Reviews

Refer to Review Procedure.

EF2 Assumptions

No assumptions are identified for this task. Refer to General Assumptions.

EF3 Permits and Public Relations

This task will obtain all permits for all field work and follow the established protocol for each type of permit required based upon output from task VF5 Review Permits and Public Relations.

EF3.1 Obtain Local Permits

This task will submit the required permits and perform all permit handling. This task will also coordinate, compile and manage documents and information necessary for submittal and completion of the permitting process.

EF3.2 Perform Public Relations

This task will support public relations by attending neighborhood or community meetings and/or creating materials to support the meetings (e.g., presentation slides).

EF3 Deliverables

1. Permits, as required, for installation of proposed equipment.
2. Materials for neighborhood or community meetings, such as presentation slides.

EF3 Reviews

One final review is planned for the deliverables created to support public relations meetings (refer to Table 1).

EF3 Assumptions

1. All permitting is complete prior to a work order being released IFC.

PUC ORGANIZATIONAL DOMAIN

EO1 Organizational Change Management

All of these change management tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan). The specific scope of this task will be determined through the completion of task VB1 Organizational Change. This task will implement the changes identified in the deliverable from task VB1 Organizational Change as approved by the PUC through task PM4 Change Management as in-scope processes.

This task may perform the following tasks based upon the output of task VB1 Organizational Change:

- EO1.1 Review In-Scope Processes
- EO1.2 Prepare Workshop Materials
- EO1.3 Conduct Workshops
- EO1.4 Transition to New Operational Processes

EO1.1 Review In-Scope Processes

This task will review all current state process documentation and process map flows for the in-scope processes in order to develop future state business processes.

EO1.2 Prepare Workshop Materials

This task will prepare workshop materials that illustrate industry best practices for business processes related to the in-scope processes. Develop future state process map flows, with responsibility matrices, at the activity level that communicates how work will be performed to develop the business processes in scope.

EO1.3 Conduct Workshops

This task will conduct a series of workshops and meetings for in-scope process designs. The workshops will include all necessary business and technical stakeholders, including Survalent or other vendors as identified in task VB1 Organizational Change. We will review process documentation and provide an overview of the future state with requirements. Deliverables include workshop notes, assumptions, action items and key business decisions; in addition, we will develop training needs and a change management plan.

EO1.4 Transition to New Operational Processes

This task will complete the transition to new operational processes through training and operational support. Training delivery will be coordinated with the task EO2 Training, so this task is primarily additional operational support outside of training.

EO1 Deliverables

Deliverables provided by task EO1 Organizational Change Management are listed in Table 29.

Table 29 Task EO1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Workshop materials, notes, assumptions, action items and key business decisions	EO1.3 Conduct Workshops		■	■	
2. Completed training plan and change management plan.			■	■	

EO1 Reviews

Refer to Review Procedure.

EO1 Assumptions

1. After training is complete, the PUC will perform the leadership role for the adoption and maintenance of the associated business process and organizational change management within the PUC.
2. Engage employees early in the program.[22]
3. Demonstrate key stakeholders support throughout the program.[23]
4. Leverage established communications platforms to provide updates to employees.[24]
5. Address organizational design during business process design.[25]
6. Effectively train end-users on business processes.[26]
7. Assess business readiness for implementation.[27]

EO2 Training

This task will perform the training activities associated with the procured major equipment and software (refer to task PR1 Major Materials and Equipment). Because training depends upon procurement and business process change (refer to task EO1 Organizational Change Management), the actual training will

[22] It is essential to gain employee acceptance and adoption of the new processes and technology being implemented for the SSG. This starts by involving employees early in the SSG implementation (prior to deployment) with business process design workshops. By including employees in these workshops, their ownership of the SSG should increase. Effectively engaging employees early will result in a smoother adoption process and higher levels of commitment.

[23] An important element for employees to see and understand the senior management support for the SSG. This demonstrated leadership will help overall organizational acceptance of the changes resulting from the SSG because employees will see leadership that is focusing on communications and upcoming activities as an important enterprise initiative.

[24] To gain credibility with employees in the impacted business units across the organization, it is essential that SSG communications are updated regularly, using existing corporate communications channels. This may include supervisors presenting communications and project information to employees in department meetings. This gains importance during implementation phase as employees engage with the SSG. We will facilitate the development of effective communications and help address specific questions from employees, comparing the new process or technology to the as-is state as needed.

[25] There are many organizational impacts resulting from the implementation of new processes and technologies as a result of the SSG, many of which may result in organizational structure changes. It is essential to identify these as part of the business process design and communicate them to executives to ensure business readiness is completed to implement these changes. Any organizational change will be effectively managed in a planned and coordinated manner to minimize the potential disruption to PUC and decrease the timeframe that it takes for PUC to return to and then exceed previous performance levels.

[26] Effective training will be essential to the successful implementation of the SSG and its new functionality. Users must understand not only how to do a specific task, but also the upstream and downstream impacts of the completion of the task (or lack thereof). Effective training means adequate time to build confidence in the SSG before the implementation and cutover dates. Additionally, the changing skillsets required by the SSG will require training and development activities to ensure that skills are relevant for the future with SSG.

[27] Employees in some departments may express concerns about the increase in their work load along with a need to manage other competing projects and priorities or decreases in their work load. It is crucial that this task accurately assess and communicate to stakeholders both increases and decreases in work load for each impacted group. This enables employees to understand what will be expected of them and can properly prepare the appropriate level of planning for the upcoming changes.

be coordinated with engineering, procurement, and organizational change activities, ideally taking place before the PoC (refer to CN1.3 Create Commissioning Plan).

EO2.1 Perform IVR Integration Training

This task will perform the IVR integration training using the training materials developed from task EA1.1.3 Develop IVR Integration Training Materials.

EO2.2 Perform CIS Integration Training

This task will perform the CIS integration training using the training materials developed from task EA1.2.3 Develop CIS Integration Training Materials.

EO2.3 Perform CYME Integration Training

This task will perform the CME integration training using the training materials developed from task EA1.3.3 Develop CYME Integration Training Materials.

EO2.4 Perform AMI Integration Training

This task will perform the AMI integration training using the training materials developed from task EA1.4.3 Develop AMI Integration Training Materials.

EO2.5 Perform OMS Training

This task will perform the OMS training using the training materials developed from task EA2.6 Develop OMS Training Materials.

EO2.6 Perform Field Equipment Training

This task will perform the field equipment training using the training materials developed from task EF1.5.1 Develop Field Device Training Materials and task EF1.5.2 Develop Cellular Training Materials.

EO2.7 Perform SCADA and ADMS Master Training

This task will perform the SCADA and ADMS training using the training materials developed from task EA4.5 Develop SCADA and ADMS Master Training Materials.

EO2.8 Perform IVR Training

This task will perform the IVR training using the materials developed from task EA5.5 Develop IVR Training Materials.

EO2 Deliverables

Deliverables provided by task EO2 Training are the completed training logs shown in Table 30 without any review (as-built).

Table 30 Task EO2 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Completed training log.	EO2.1 Perform IVR Integration Training EO2.2 Perform CIS Integration Training EO2.3 Perform CYME Integration Training EO2.4 Perform AMI Integration Training EO2.5 Perform OMS Training EO2.6 Perform Field Equipment Training EO2.7 Perform SCADA and ADMS Master Training EO2.8 Perform IVR Training				■

EO2 Reviews

No reviews are anticipated for the deliverables from the task EO2 Training.

EO2 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

Step 2 Procurement

PURCHASING

All materials purchased for the project will meet the Ontario Regulation 22/04.

PR1 Major Materials and Equipment

This task will perform the procurement process following the project's procurement plan based upon the output of task VP2 Establish Material Management Requirements, an internal document as part of the PEP (refer to PM9 Project Execution Plan (PEP)) that defines the procurement activities, such as:

- Purchasing and subcontracting
- Inspecting and testing
- Remittance
- Material management. Material management is comprised of all purchasing, expediting, supplier quality surveillance, traffic and logistics, and field purchasing and warehousing activities required for project execution.

Special handling. The procurement plan will identify any specialized storage and handling to meet vendor warranty requirements (refer to task There are no specific assumptions for this task. Refer to General Assumptions.

- PR4 Inspect and Verify OEM Specs).

This task will execute the procurement plan to procure the following:

1. PR1.1 Purchase Survalent Software
2. PR1.2 Purchase Field Equipment
3. PR1.3 Purchase Cellular Equipment
4. PR1.4 Purchase IVR Software
5. PR1.5 Server Hardware

This task will be coordinated with the task VF2.3 Standardized Field Equipment Designs that develops standard bill of materials (overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, and FCI; refer to Table 13), task PR3 Establish and Manage Inventory and Warehouse, and task There are no specific assumptions for this task. Refer to General Assumptions.

PR4 Inspect and Verify OEM Specs.

Any procurement activities that could impact the project scope, schedule, or budget will be evaluated per task PM4 Change Management.

PR1.1 Purchase Survalent Software

This task will track and manage the purchase of all software procured from Survalent. For related hardware, refer to task PR1.5 Purchase Server Hardware. This task also provides the vendor's standard set of documentation, such as user's guide, installation guide, editing guide, operator guide, etc.

PR1.2 Purchase Field Equipment

This task will track and manage the purchase of voltage regulators, capacitor banks, and other major line equipment shown in Table 12 and Table 13. This task also provides the deliverable of the vendor's standard set of documentation, such as user's guide, installation guide, operator guide, etc.

PR1.3 Purchase Cellular Equipment

This task will track and manage the purchase of cellular equipment, if required. This task also provides the vendor's standard set of documentation, such as user's guide, installation guide, operator guide, etc.

PR1.4 Purchase IVR Software

This task will track and manage the purchase of the IVR software. This task also provides the vendor's standard set of documentation, such as user's guide, installation guide, operator guide, etc.

PR1.5 Purchase Server Hardware

This task will track and manage the purchase of the server hardware identified in task VO6 Identify the Virtual Server Requirements.

PR1 Deliverables

1. Copies of all delivery receipts of received materials.
2. Standard set of Survalent software documentation.
3. Standard set of server hardware documentation.
4. Standard set of field equipment documentation.
5. Standard set of cellular equipment documentation.

PR1 Reviews

The deliverables for task PR1 Major Materials and Equipment will be issued without any planned reviews.

PR1 Assumptions

1. The PUC purchases the required cellular licenses that establish cellular connectivity with the field devices supporting cellular communications.

PR2 Purchase All Other Materials and Equipment

This task will perform the procurement process that follows the project's procurement plan to purchase all other materials and equipment not accounted for in task PR1 Major Materials and Equipment (i.e., minor materials such as fuse blocks, connectors, wire, etc.).

PR2 Deliverables

There are no deliverables for this task.

PR2 Reviews

The deliverables for task PR2 Purchase All Other Materials and Equipment will be issued without any planned reviews.

PR2 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

PR3 Establish and Manage Inventory and Warehouse

This task will establish and manage the warehouse per the output of task VP2 Establish Material Management Requirements. This task will also close the warehouse facility once all material has been received and distributed to the field for installation.

PR3.1 Establish and Manage Inventory and Warehouse for Major Materials

This task will establish and manage inventory and warehouse for major materials as noted above. This task will coordinate with task PR1 Major Materials and Equipment to warehouse the major equipment until it is required for tasks ST1 Stage Major Systems and Test and ST2 Kit and Prepare for Field. Design of the lab will also be coordinated (refer to task EA7.1 Design Lab Facility and Test System) as procurement of field devices for the lab facility is required.

Field devices required for the test lab facility will be diverted from the ordered quantities and/or obtained on loan from vendors, used in the lab facility, and then shipped to the field for installation, returned to the vendor, or left with the lab facility for delivery to the PUC in task ST1.3 Delivery of Lab to the PUC.

PR3.2 Establish and Manage Inventory and Warehouse for All Other Materials

This task will establish and manage inventory and warehouse for all other materials as noted above. This task will coordinate with task PR2 Purchase All Other Materials and Equipment to warehouse the other equipment until it is required for tasks ST1 Stage Major Systems and Test and ST2 Kit and Prepare for Field. Design of the lab will also be coordinated (refer to task EA7.1 Design Lab Facility and Test System) as procurement of other material for the lab facility may be required.

Other material required for the test lab facility will be diverted from the ordered quantities.

PR3 Deliverables

There are no deliverables to the PUC for task PR3 Establish and Manage Inventory and Warehouse except for updates to the project schedule related to receipt and disbursement of received materials.

PR3 Reviews

Refer to Review Procedure.

PR3 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

PR4 Inspect and Verify OEM Specs

Once task PR3 Establish and Manage Inventory and Warehouse receives shipments, this task will inspect and verify all equipment received and tag each component as required. All deliveries will be properly

checked and inspected immediately upon delivery (or within 48 hours of time of receipt), including photographs. The inspection and verification process will (as applicable):

- Check all deliveries against the packing list and/or a copy of the purchase order prior to being off-loaded whenever possible. If this is not possible, the delivery shall be checked against the purchase order as soon as possible after off-loading.
- Photograph the received material prior to off-loading whenever possible. Photographs should be uploaded to the material management system and attached to the receiving document.
- Perform a visual inspection of the shipment and all containers, boxes, pallets, crates, etc., to determine whether any damage has occurred.
- Check load binders, cribbing, and tie-downs for evidence of load shifting during transit.
- Review the manufacturer's shipping and receiving requirements to determine whether the carrier has complied with all shipping and handling instructions during transit.
- If impact recorders are used, remove the records/results and check against the recorder instructions. Date, file, and distribute results appropriately.

PR4 Deliverables

There are no deliverables to the PUC for task There are no specific assumptions for this task. Refer to General Assumptions.

PR4 Inspect and Verify OEM Specs except for updates to the project schedule related to receipt and disbursement of received materials.

PR4 Reviews

Refer to Review Procedure.

PR4 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

STAGING AND TESTING

All staging and testing tasks will require coordination with the PoC (refer to CN1.3 Create Commissioning Plan).

ST1 Stage Major Systems and Test

This task will coordinate and use the lab to execute the lab testing plan (refer to EA7.2 Create Lab Testing Plan).

ST1.1 Install the Lab Test System

This task will install the lab test system at the warehouse facility using the design created in task EA7.1 Design Lab Facility and Test System.

After the successful migration of the Survalent system to a virtual environment in task CO1 Migrate SCADA to ADMS Server, the PUC will follow the identified process to replicate the existing Survalent production system from the new virtual server to another virtual server.

ST1.2 Perform Lab Testing

This task will execute the lab testing plan created in task EA7.2 Create Lab Testing Plan.

ST1.3 Delivery of Lab to the PUC

Once all lab testing is successfully completed in task ST1.2 Perform Lab Testing and the cut-over to the production system in task CO4 Cut-Over from Test System to Production System is complete, this task will relocate the lab to its final location at the PUC, if required (refer to task VO11 Review Lab Facility).

ST1.4 Install Lab at the PUC

This task, if required, will receive the lab equipment and permanently install it in the PUC's facility.

ST1 Deliverables

Deliverables provided by task ST1 Stage Major Systems and Test are listed in Table 31.

Table 31 Task ST1 Deliverable List

DELIVERABLE DESCRIPTION	TASK	PRELIMINARY	FINAL	IFC	AB
1. Completed lab testing plan.	ST1.2 Perform Lab Testing			■	
2. Delivery confirmation of lab equipment to PUC facility (if required).	ST1.3 Delivery of Lab to the PUC			■	

ST1 Reviews

Refer to Review Procedure.

ST1 Assumptions

1. Two weeks of onsite services are included for OMS commissioning that also includes system training (refer to task EO2 Training).
2. Two weeks of onsite services are provided for FDIR points checkup, validation of database points including field devices and substation devices.
3. Four weeks of onsite services are provided for VVO commissioning, validation of database and displays for regulators and capacitor bank controllers.
4. Two weeks onsite commissioning for AMI system integrations.

ST2 Kit and Prepare for Field

This task will create kits for all equipment required to be delivered to the field for the construction crews. Kits will be ready for field deployment.

ST2 Deliverables

There are no deliverables to the PUC for task ST2 Kit and Prepare for Field except for updates to the project schedule to indicate site-specific kits are ready for installation.

ST2 Reviews

Refer to Review Procedure.

ST2 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

Step 2 Construction/Implementation

The construction domain includes the construction work and implementation across operational, substation, and field domains, plus a commissioning phase that coordinates across all three domains. All construction work will follow the Construction Execution Plan (CEP) and be performed to meet the Ontario Regulation 22/04.

CN1 CONSTRUCTION ACTIVITIES AND MANAGEMENT

This task will provide overall construction management services and perform construction work per the CEP:

1. CN1.1 Perform Pre-Mobilization/Mobilization Activities
2. CN1.2 Create Turnover Packages
3. CN1.3 Create Commissioning Plan
4. CN1.4 Manage Construction
5. CN1.5 Manage Commissioning
6. CN1.6 Perform Closeout Activities

This task will provide the functional direction and support of all construction work. Construction departments, as required (e.g., Construction Operations, Technology, Quality Control, and Safety), report to the Construction Operations Manager and are responsible for the execution of their assigned construction activities.

CN1.1 Perform Pre-Mobilization/Mobilization Activities

This task will:

1. Provide input to related project tasks.
2. Conduct internal construction meetings.
3. Create the CEP and other internal construction execution manuals that contain the requirements for execution of all construction activities on the project as required by the PEP.
4. Setup the project's site construction operation and offices that include the lab (refer to task ST1.2 Perform Lab Testing).
5. Coordinate with task PM5.4 Construction Schedule to prepare and maintain the project's construction schedule.

CN1.2 Create Turnover Packages

This task will develop the turnover packages for each of the identified small "manageable pieces" (refer to Figure 1). The grouping should promote the most efficient execution of construction completion, commissioning activities, staffing and task assignments, and documentation organization.

Development of turnover packages is a two-stage process:

1. Define the turnover packages using Figure 1 as a guideline, whose output will be a list of turnover packages. This list shows the breakdown of all components into groupings of common equipment that are logically grouped together to sequence the testing leading up to larger turnover packages until a final turnover package is generated for the SSG along with the final completion notice. The following types of turnover packages are expected:
    a. Construction personnel to commissioning personnel for each equipment and/or location.
    b. System turnover package for each group or "manageable piece".
    c. Final turnover package to the PUC along with the final completion notice.
2. Develop the listed turnover packages. These will be used during the commissioning phase (refer to CN1.3 Create Commissioning Plan and CN1.5 Manage Commissioning) to formally document the turnover of the work.

These two stages will be started as early as possible in the project, allowing personnel to concentrate on construction completion and commissioning activities instead of the development of turnover packages while construction and commissioning activities are ongoing. Field/lab turnover packages should all be completed prior to the start of any field/lab commissioning activities on the project.

Turnover packages typically contain the following:

1. Package Scope Definition. This section defines the scope of the package and how it fits into either lab testing or the commissioning phase.
2. Package Status Section. This section is used to track the turnover package, from its completion by the construction team, acceptance by the commissioning team, up to final acceptance by the PUC.
3. Sections for each discipline involved, as necessary:
    a. Mechanical, such as rotating equipment and piping, plus related accessories.
    b. Electrical, such as power and control circuits.
    c. Instrumentation, such as equipment providing a signal to a controller.
    d. Communication, such as proper communication wiring between devices.
4. Supplier/Miscellaneous Section. This includes miscellaneous information as required to complete the record of the specific activities (e.g., supplier site visit reports, maintenance records).

5. Package Drawings. This includes a list of as-built drawings within the package scope boundaries defined as described above.
6. Welding Quality Control Records. If performed, these would be turned over by the construction team.
7. Testing Reports. This includes completed test plans showing any punch list items as being completed.
8. Supplier Documentation. This includes items such as operation and maintenance manuals, shop drawings, etc. that are received from the supplier(s) and specific to the group or "manageable piece".
9. Conformed to Construction Records, or as-builts. These will be maintained locally and turned over to the PUC (e.g., one markup copy could be kept on site and available for reference until such time as the final conformed drawings are available). Examples of what may be included are:
    a. Final files (such as configurations)
    b. System backups
    c. Final conformed to construction drawings
    d. Training logs

The final turnover package will contain, in addition to the items above, include an inventory of all turnover packages and their assembly into a final, completed turnover package.

Other items relating to final turnover package may include any contract spares and special tools.

CN1.3 Create Commissioning Plan

The commissioning occurs during construction, spans all three domains, and relies on the SSG project being broken down into more "manageable pieces" for commissioning purposes. The definition of these "manageable pieces" will be a deliverable provided in task CN1.2 Create Turnover Packages. Once the "manageable pieces" are established, the Commissioning Plan (CP) is created by this task. The CP is used to document and manage the commissioning sequence for each defined "manageable piece".

The actual commissioning phase work starts when the construction team completes its work on items within a defined "manageable piece", provides the commissioning team with the turnover package, and the turnover package is accepted by the commissioning team. Each transfer is accomplished by using a turnover package, which will be a deliverable created from task CN1.2 Create Turnover Packages.

Turnover is the transfer of the care, custody and control of the unit from construction personnel to commissioning personnel. Turnover may involve the transfer of substantial quantities of documentation and physical assets. All turnovers will be documented with detailed, itemized, signed manifests and receipts (refer to task CN1.2 Create Turnover Packages).

The CP will be created as early in the project as possible and in coordination with the other testing plans as laid out in Figure 1 and Figure 2:

- EA1.1.2 Develop IVR Integration Software Testing Plan
- EA1.2.2 Develop CIS Integration Software Testing Plan
- EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)
- EA1.4.2 Develop AMI Integration Software Testing Plan
- EA2.5 Develop OMS Software Testing Plan
- EA3.3.3 Field Equipment Template Testing Plans
- EA4.3 Develop SCADA Master End-to-End Testing Plan
- EA4.4 Develop SCADA and ADMS Software Testing Plan
- EA5.4 Develop IVR Software Testing Plan
- EA6 Develop Cut-Over Plan

- EA7.2 Create Lab Testing Plan

The overall CP for the SSG Project includes these testing plans developed in the engineering domain. Figure 1 visualizes the CP concept.

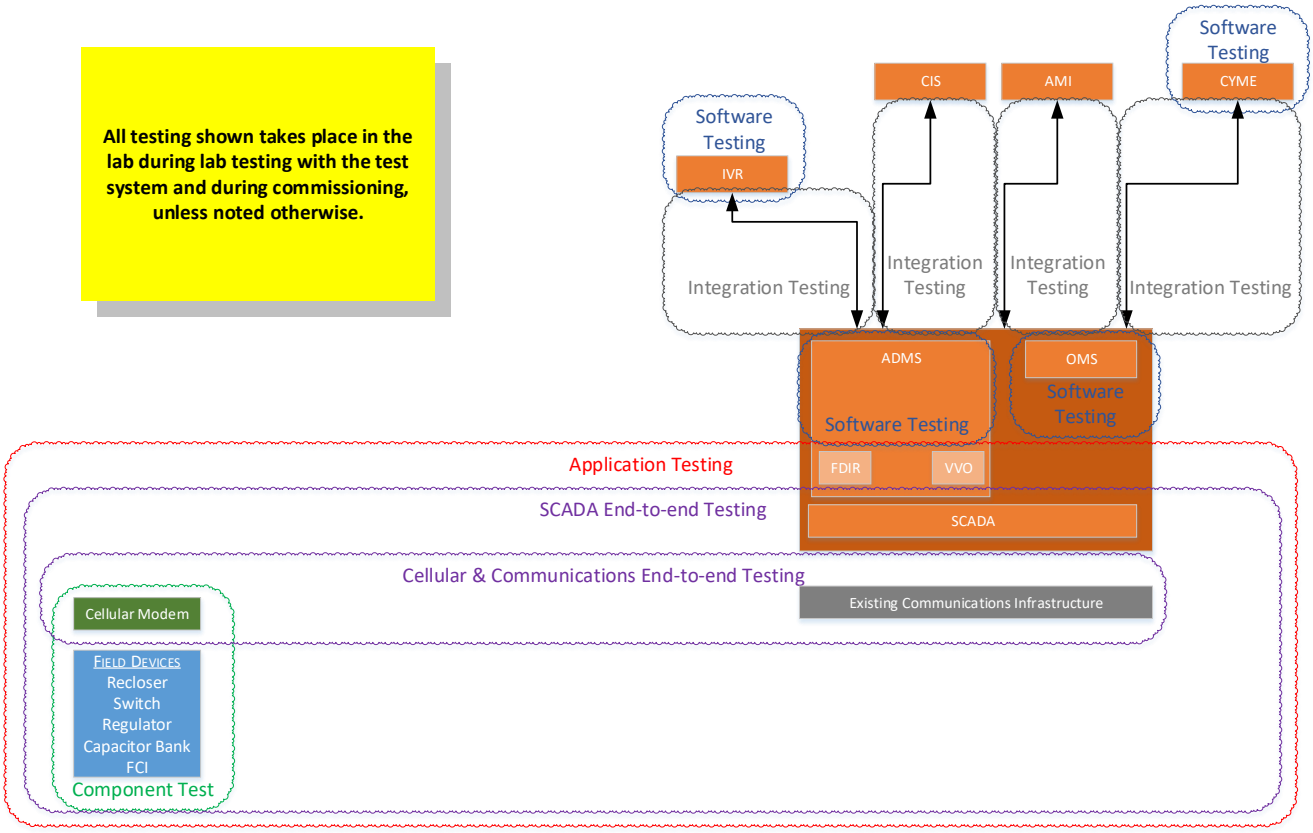


Figure 1 High Level Testing Concept

The SSG Project is broken down into "manageable pieces" with different testing plans (as identified above) that will build upon each other as described in this section.

The first testing is undertaken as part of the PoC to confirm that the drawing standards, configuration standards, updated processes, updated screens in the ADMS, and VVO and FDIR applications work correctly. Lessons learned activities will be performed to identify any gaps or improvements needed, with remediations completed prior to the completion of new installation work associated with those remediations. Deliverables will be grouped so that those related to the PoC are completed before the start of the PoC. After the PoC lessons learned activity, the remaining deliverables will be completed. This approach limits the level of troubleshooting required should errors occur during subsequent testing phases.

Testing Plan Structure

Each testing plan includes the following:

1. A revision block to track the revisions to the plan, submissions, and approvals.

2. Introduction. This contains the summary of the testing plan and includes the following:
    a. Objectives (goals) of the testing plan.
    b. Test items, a list of what will be tested.
    c. Test descriptions, a high-level description of the tests being performed and justifications for anything that will not be tested.
    d. Resource requirements (people and tools) for the tests being performed
    e. Expected test duration (based upon budget constraints)
    f. Any constraints and limitations of the testing plan.
3. Approach. This contains details of how testing will be performed, including information such as the sources of test data, inputs and outputs, testing techniques and priorities. The approach defines the guidelines for requirements analysis, develop scenarios, derive acceptance criteria, construct and execute test cases.
4. Tests to be performed. This contains all test cases with details on how testing will be performed, with a tie to a specific design requirement from this document, the expected results, and the actual results. If a master testing plan, this will include only references to other testing plans and their order of completion and tracking of their completion.
5. Action items (punch list). This section identifies deficiencies or other items encountered during testing that require resolution. This section is used to track each until all are successfully completed.

Each testing plan will be submitted to the PUC for review per the review cycles shown in CN1 Reviews and be approved prior to first use on the SSG Project. A more detailed relationship between the testing plans is shown in Figure 2. Note that in Figure 2 the following:

1. There are blocks of time that can be inferred, but these do not represent any defined period and are not meant to imply any level of effort.
2. Tasks are not linked for simplification purposes, but order is represented from left to right (any predecessor tasks are shown to the left of any given task). This is meant to provide some sense of order, but it is entirely possible that some tasks could occur in parallel if resources permit (for example, the field tests for reclosers and switches).
3. The testing is organized for the feeders and substations involved (refer to the total row in Table 12 for the number of feeders involved and substations involved). After the application tests are completed, the additional testing up to the SCADA end-to-end testing will be carried out on a first set of feeders that are assumed to completely support VVO and FDIR applications; the second set support only VVO; and the final set is for testing the FCI that support the FDIR on sub-transmission.
4. Not all feeders will have all field equipment and the actual testing plans will be adjusted.
5. Substantial completion is achieved when testing is complete as in the example shown in Figure 2.

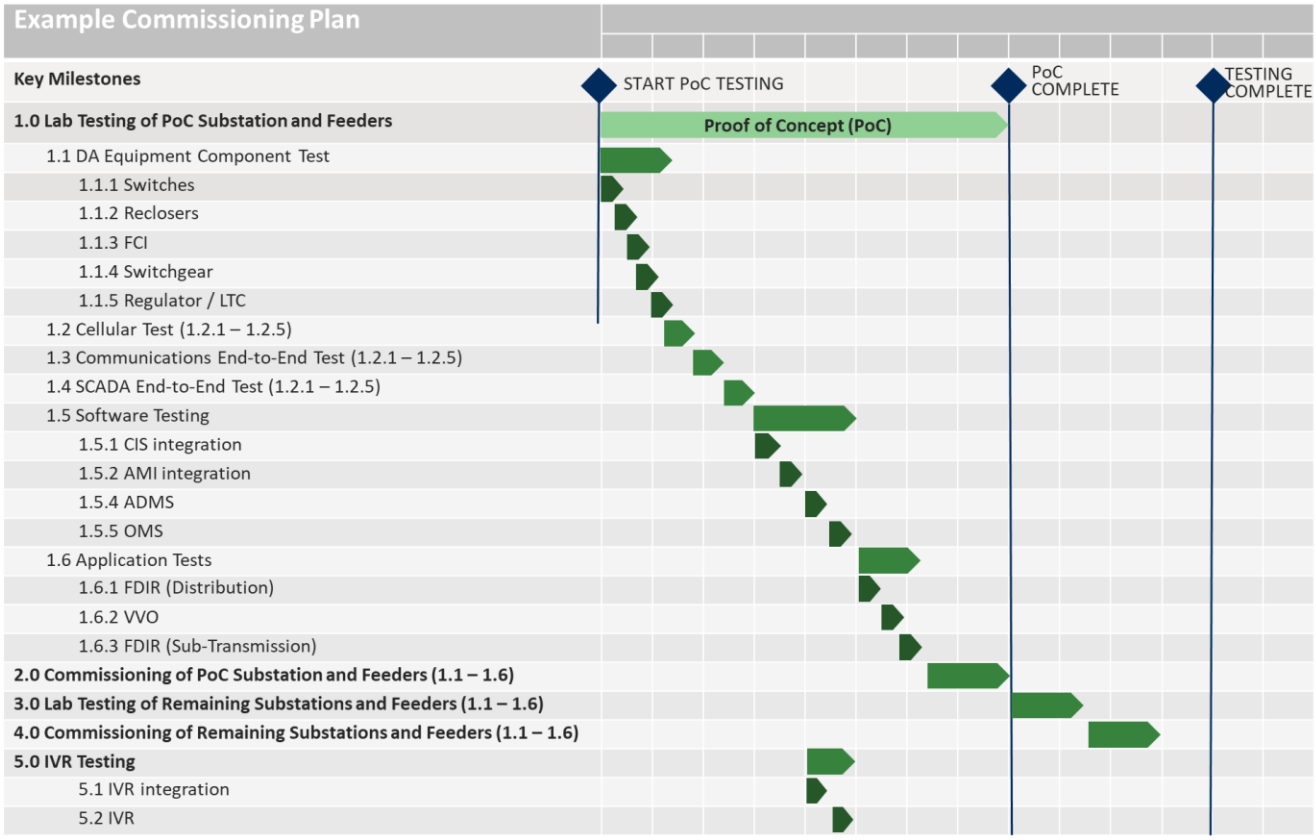


Figure 2 Example CP

Component Testing Plan

The component testing plan defines the two tests to be performed by the commissioning team at the system level (e.g., overhead regulator, overhead recloser, overhead switch, pad mounted switchgear, capacitor bank, FCI)(refer to Table 13) after turnover from the construction team (i.e., construction is complete on the unit) either in the field (commissioning) or in the lab (lab testing)[28]:

1. Functional checkout, whose objective is to verify proper construction and the as-installed working order of the unit such that the unit can support the logical checkout. When completed, the component may be considered as attained functional completion.

2. Logical checkout, whose objective is to verify that the local operation of the unit properly supports the unit's intended purpose in the SSG Project.

The functional checkout tests include those recommended by the vendor, such as

1. Comparison of as installed condition with the design drawings and specifications, such as:

[28] For lab testing, the unit will not include the whole assembly, but just the controller connected to equipment to simulate the whole assembly.

a. Mechanical checks: such as mounting, orientation, location, access, installed condition, alignment, etc.

b. Electrical and control checks: such as wire / cable size, heater / overload settings, cable routings, and cable terminations; electrical equipment and instrument mounting, orientation, location, access, installed condition, etc.

c. Electrical equipment, and power / control circuit testing verifications: such as Meggering, HyPot, wire ring out (termination verification), motor rotation check, etc.

d. Instrumentation / status / control circuit functionality checks: such as calibrations and other generally functional checks for its purpose.

e. Development of construction completion punch list of deficiencies or other items with follow-through to ensure critical items (such as manufacturer defects) are resolved in time to support the project schedule.

2. Minor system specific cleaning operations (such as relatively small tasks of flushing, blowing, or mechanical cleaning on a component or within a system) and any necessary lubrication of components of the unit.

3. Operability review: Reviewing the as designed/as installed system and ensuring it will function properly for its intended purpose, implementing any process related changes required to correct deficiencies, and/or making provisional preparations for the next phase of tests. This review includes simple power on tests to verify proper operation through simple observation of status indications (e.g., LEDs, lights, status messages on LCD screens).

Next, logical checkout are local functional checks (e.g., relay trip checks) to confirm proper local operation of the unit including logical functions, local alarms, local user interface or display, proper power on test, reboot test, etc. This check includes simple communication test to confirm proper communications (e.g., the controller for the field equipment is on the communication network or that the cellular modem is properly communicating at a basic level prior to a more comprehensive test in the cellular end-to-end testing plan).

Note that component testing plans will be successfully completed first on cellular equipment because basic communication tests for any controllers will not be successful if the cellular equipment is not first functioning properly.

Cellular Testing Plan

The cellular testing plan objective is to confirm the proper functionality of the cellular modem without testing the supported IP-based data/application flows that are traversing the cellular network. The cellular test will start after completion of the field test for the field equipment and be successfully completed before the communications end-to-end test is started. This testing will not test the supported TCP/IP communications, that is part of the communications end-to-end testing.

Communications End-to-End Testing Plan

The communications end-to-end testing plan objective is to confirm whether the TCP/IP communications network is functional, that traffic is as designed (SCADA traffic will be confirmed after SCADA end-to-end testing is complete), and the network is performing as expected. This testing will not start until the successful completion of the cellular test. This testing will be successfully completed before the SCADA end-to-end testing is started for the location.

SCADA End-to-End Testing Plan

The SCADA end-to-end testing plan objective is to verify that the SCADA master communicates using DNP3 (IEEE 1815) with the controller for the field equipment (i.e., field devices, refer to Table 13) performs as designed. The tests will perform a typical SCADA point check to perform control and monitoring of the field equipment. This test will include trip/close simulation to the test switches (as applicable and available) and simulation of monitored points (as applicable and available).

Application Testing Plan

The application testing plan objective is to confirm proper operation of the following applications: FDIR and VVO. Application testing will simulate inputs into each application from within the ADMS and confirm that the application properly performs:

1. FDIR: Feeder and sub-transmission reconfiguration based upon simulated faults in the ADMS, including a return to normal for all operating modes.

2. VVO: Operation of field equipment (regulators, LTC, and capacitor banks) based upon simulated inputs to the ADMS.

Application testing will start as follows:

1. FDIR: after the successful completion of the SCADA end-to-end testing for each of the typical feeder configurations and ADMS software testing.

2. VVO: after the successful completion of the SCADA end-to-end testing for a single feeder with voltage regulator and successful completion of the software testing for the CYME and AMI integrations and ADMS software testing.

Software Testing Plan

The software testing plan objective is to confirm proper operation of the following:

1. The functionality is as designed for the following integrations: IVR, CIS integration, and AMI integration. These will be tested to confirm the data transfer between applications occurs as designed.

2. ADMS functionality is as designed outside of what is confirmed during SCADA end-to-end testing, VVO testing, and FDIR testing.

3. OMS functionality is as designed outside of the integrations.

The CYME integration test will be used to perform the final import of CYME data into the test system and will be performed well before other testing. No additional updates to the CYME data are expected with this final import.

Software testing for most applications will be first performed in the lab and then repeated on the development system prior to cut-over to production.

CN1.4 Manage Construction

This task manages the following construction work tasks in accordance with the CP:

1. Safety activities.
2. Field supervision and monitoring of construction activities.
3. Permitting assistance (refer to task EF3 Permits and Public Relations).
4. Construction of the work order packages for each site or location or unit (e.g., recloser location, FCI location, switch location, radio location).
5. Construction inspection, a task that uses a checklist to ensure each site is ready for commissioning activities. The construction inspection checklist includes items such as reviewing the turnover package documentation and performing a walk-down of the constructed system to ensure that construction is complete. The inspection checklist includes the generation of a punch list of deficiencies or other items that need to be completed before turnover starts. Upon construction turnover, project ownership transfers to the commissioning personnel.

CN1.5 Manage Commissioning

This task manages the execution of the CP. Refer to CN1.3 Create Commissioning Plan.

CN1.6 Perform Closeout Activities

This task will perform the closeout activities, starting after the completion of task CN1.5 Manage Commissioning. During these activities site staff and operations are demobilized. Closeout activities are coordinated with final completion.

CN1 Deliverables

The CP is coordinated with the schedule maintenance; as the CP is completed with actual and planned dates, it is provided to the project team and related updates to the project schedule occur.

1. Turnover package list from task CN1.2 Create Turnover Packages.
2. Turnover package from task CN1.2 Create Turnover Packages.
3. Construction inspection checklist from task CN1.4 Manage Construction.
4. Startup Completion Certificate from task CN1.5 Manage Commissioning.
5. System turnover acceptance certificate.
6. System turnover packages.
7. The final completion notice from task CN1.2 Create Turnover Packages.

CN1 Reviews

The review and approval of the deliverables will be in accordance with Table 1and Appendix 2 – Responsibilities Matrix, except for the final completion notice that has no review.

CN1 Assumptions

1. Construction management activities do not include staff augmentation or owner's/resident engineer during construction.

PUC OPERATIONAL DOMAIN

These tasks perform all construction work associated with the PUC operational domain.

CO1 Migrate SCADA to ADMS Server

This task will migrate the existing Survalent SCADA from the existing hardware platform to the new virtual environment (refer to task VO6 Identify the Virtual Server Requirements). The test plan developed from task EA4.4 Develop SCADA and ADMS Software Testing Plan will be followed to confirm correct operation of the new environment.

CO1 Deliverables

1. Completed test plan from task EA4.4 Develop SCADA and ADMS Software Testing Plan.

CO1 Reviews

No reviews are expected for the task CO1 Migrate SCADA to ADMS Server.

CO1 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

CO2 Construction of the Lab Facility

This task constructs the lab facility with a connection to the Survalent test system per the design developed in task EA7.1 Design Lab Facility and Test System.

CO2 Deliverables

1. No deliverables are expected for the task CO2 Construction of the Lab Facility.

CO2 Reviews

No reviews are expected for the task CO2 Construction of the Lab Facility.

CO2 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

CO3 Perform Communication Testing

This task will perform the various communication tests shown in Figure 2 and developed in earlier tasks:

1. Cellular test per the test created in task EA3.3.3.3 Develop Template Cellular Testing Plan.
2. Communications test per the EA3.3.3.4 Develop Template Communications End-to-End Testing Plan.
3. SCADA end-to-end test per the end-to-end testing plan created in task EA4.3 Develop SCADA Master End-to-End Testing Plan

These tests will begin after the component testing is successfully completed in task CF1.2 Component Test Field Equipment. This task will use the test system to perform as part of the overall CP (refer to CN1.3 Create Commissioning Plan), which also addresses the prerequisites for testing.

CO3 Deliverables

1. Completed testing plans.

CO3 Reviews

The review and approval of the completed testing plan will be in accordance with Table 1 and Appendix 2 – Responsibilities Matrix.

CO3 Assumptions

1. Because the SCADA point check has already been tested in the lab facility in task ST1 Stage Major Systems and Test, the end-to-end testing performed in task is expected to experience only minor issues and no significant delays.
2. Two weeks of contiguous onsite services are required for end-to-end testing for FDIR devices, which is the validation of SCADA database points for all FDIR associated field devices and substation devices.

CO4 Cut-Over from Test System to Production System

This task performs the cut-over from the test system utilized in task ST1 Stage Major Systems and Test to the production system using the plan developed in task EA6 Develop Cut-Over Plan.

CO4 Deliverables

1. Completed cut-over plan.

CO4 Reviews

The review and approval of the completed cut-over plan will be in accordance with Table 1 and Appendix 2 – Responsibilities Matrix.

CO4 Assumptions

1. The SCADA master control room will be ready for the cut-over from the test system and be able to function as the production system (refer to EA6 Assumptions).

CO5 Perform IVR Go-Live

This task performs the testing indicated in the task EA5.4 Develop IVR Software Testing Plan.

CO5 Deliverables

1. Completed IVR testing plan from task EA5.4 Develop IVR Software Testing Plan.

CO5 Reviews

The review and approval of the completed test plan will be in accordance with Table 1and Appendix 2 – Responsibilities Matrix.

CO5 Assumptions

1. The go-live is completed during a single contiguous site trip for one day.

PUC SUBSTATION DOMAIN

These tasks perform all construction work associated with the PUC substation domain. Limited construction work is planned for the SSG Project in the substation domain.

CS1 Install Communications to and at Substations (placeholder)

This task is a placeholder task because no installation of communication equipment inside substations is planned for the SSG Project.

CS2 Update Substation IEDs (placeholder)

This task is a placeholder task because under the baseline scope it is unanticipated. This task remains here as a placeholder in case it is discovered during task VO4 Evaluate SCADA Data that substation IEDs require one or more modifications to support the data requirements to support FDIR and/or VVO.

PUC FIELD DOMAIN

These tasks perform all construction work associated with the PUC field domain.

CF1 Install Field Equipment

This task will install and test the field equipment (refer to Table 13) (outside the substations).

CF1.1 Construct Field Equipment

This task will review and install the field equipment (refer to Table 13) per the work orders developed in task EF1 Detailed Design for Field Equipment.

CF1.2 Component Test Field Equipment

This task will perform the component testing plan for the field equipment supporting FDIR and VVO applications using the site-specific component testing provided with the work orders. Figure 2 shows how the component test of field equipment is coordinated with other testing plans. The tests in task CO3 Perform Communication Testing will be performed after the successful completion of this task.

CF1 Deliverables

1. Work order as-built from task CF1.1 Construct Field Equipment.
2. Completed component testing plan from task CF1.2 Component Test Field Equipment.

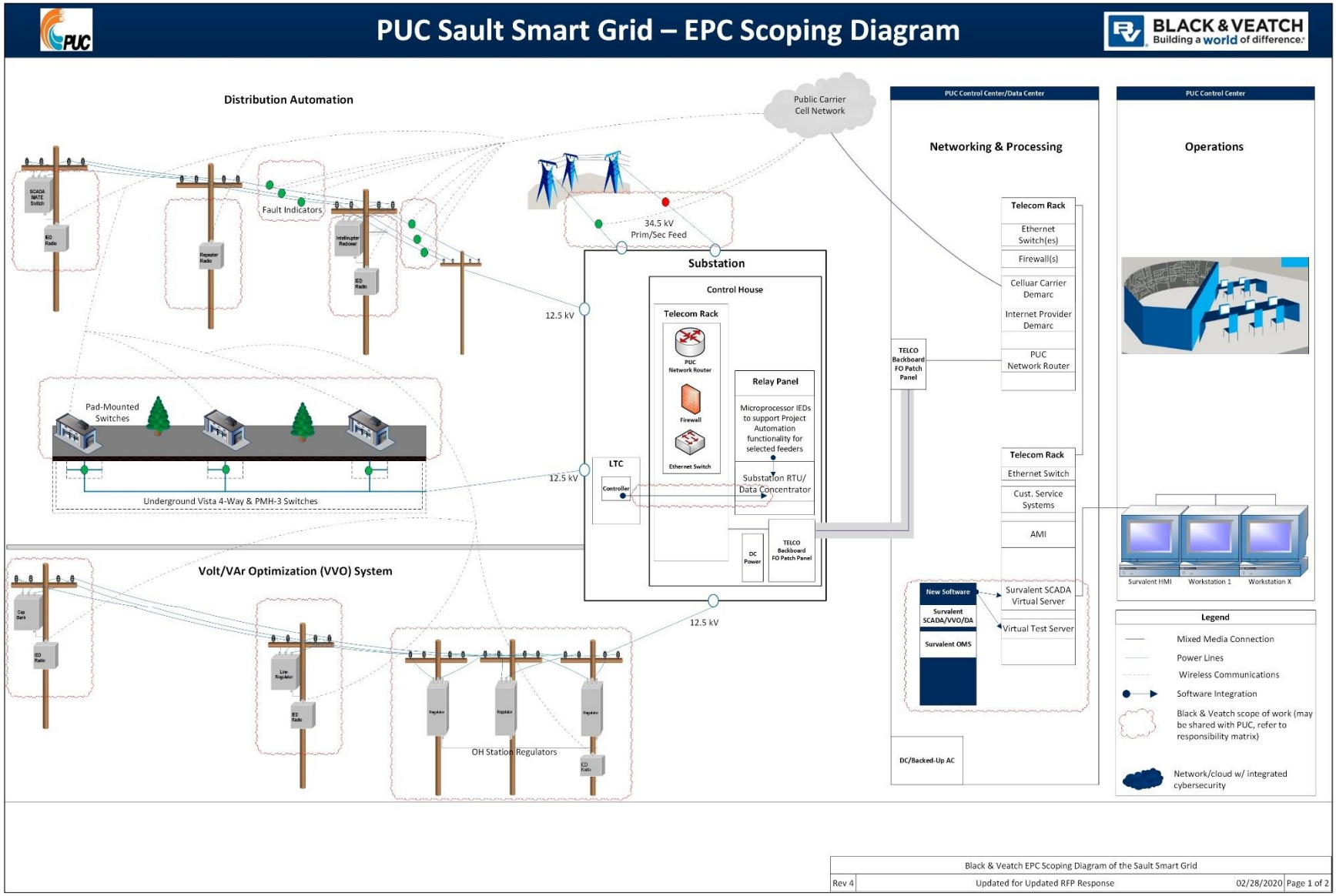
CF1 Reviews

1. The review and approval of the work order as-builts and completed testing plans will be in accordance with Table 1 and Appendix 2 – Responsibilities Matrix.

CF1 Assumptions

There are no specific assumptions for this task. Refer to General Assumptions.

Appendix 1 – Scoping and Logical Diagrams


PUC Sault Smart Grid – EPC Scoping Diagram
BLACK & VEATCH
Building a world of difference.
Distribution Automation
Public Carrier Cell Network
PUC Control Center/Data Center
Networking & Processing
PUC Control Center
Operations
Fault Indicators
34.5 kV Prim/Sec Feed
Substation
Control House
Telecom Rack
PUC Network Router
Firewall
Ethernet Switch
Relay Panel
Microprocessor IEDs to support Project Automation functionality for selected feeders
Substation RTU/ Data Concentrator
LTC
Controller
DC Power
TELCO Backboard FO Patch Panel
12.5 kV
Pad-Mounted Switches
Underground Vista 4-Way & PMH-3 Switches
Volt/VAr Optimization (VVO) System
OH Station Regulators
Telecom Rack
Ethernet Switch(es)
Firewall(s)
Celluar Carrier Demarc
Internet Provider Demarc
PUC Network Router
Telecom Rack
Ethernet Switch
Cust. Service Systems
AMI
New Software
Survalent SCADA/VVO/DA
Survalent OMS
Survalent SCADA Virtual Server
Virtual Test Server
DC/Backed-Up AC
Survalent HMI
Workstation 1
Workstation X
Legend
Mixed Media Connection
Power Lines
Wireless Communications
Software Integration
Black & Veatch scope of work (may be shared with PUC, refer to responsibility matrix)
Network/cloud w/ integrated cybersecurity
Black & Veatch EPC Scoping Diagram of the Sault Smart Grid
Rev 4
Updated for Updated RFP Response
02/28/2020
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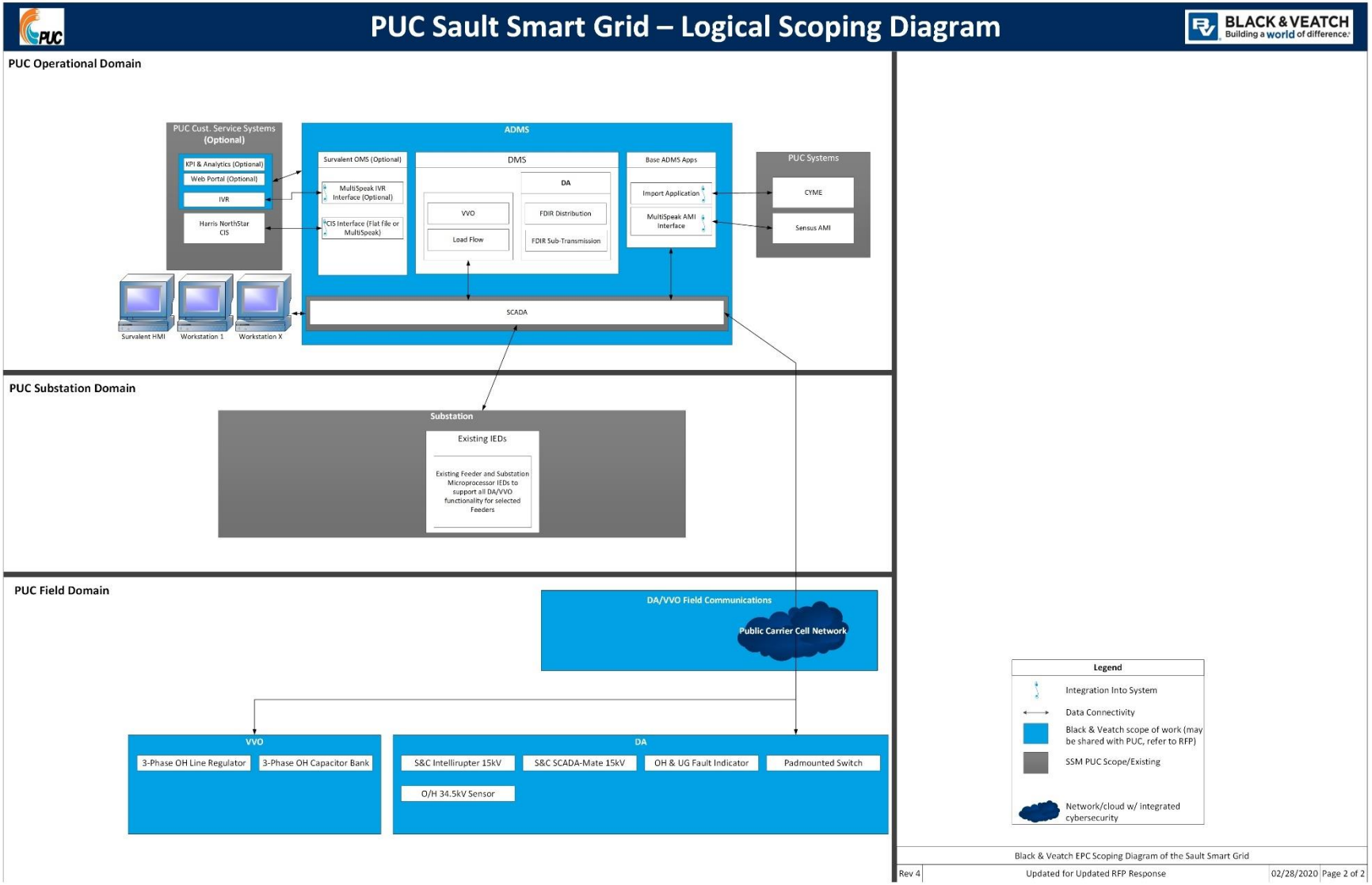
PUC Sault Smart Grid – Logical Scoping Diagram
BLACK & VEATCH
Building a world of difference.
PUC Operational Domain
PUC Cust. Service Systems (Optional)
KPI & Analytics (Optional)
Web Portal (Optional)
IVR
Harris NorthStar CIS
ADMS
Survalent OMS (Optional)
MultiSpeak IVR Interface (Optional)
CIS Interface (Flat file or MultiSpeak)
DMS
VVO
Load Flow
DA
FDIR Distribution
FDIR Sub-Transmission
Base ADMS Apps
Import Application
MultiSpeak AMI Interface
PUC Systems
CYME
Sensus AMI
SCADA
Survalent HMI
Workstation 1
Workstation X
PUC Substation Domain
Substation
Existing IEDs
Existing Feeder and Substation Microprocessor IEDs to support all DA/VVO functionality for selected Feeders
PUC Field Domain
DA/VVO Field Communications
Public Carrier Cell Network
VVO
3-Phase OH Line Regulator
3-Phase OH Capacitor Bank
DA
S&C Intellirupter 15kV
S&C SCADA-Mate 15kV
OH & UG Fault Indicator
Padmounted Switch
O/H 34.5kV Sensor
Legend
Integration Into System
Data Connectivity
Black & Veatch scope of work (may be shared with PUC, refer to RFP)
SSM PUC Scope/Existing
Network/cloud w/ integrated cybersecurity
Black & Veatch EPC Scoping Diagram of the Sault Smart Grid
Rev 4
Updated for Updated RFP Response
02/28/2020
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Appendix 2 – Responsibilities Matrix

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Engineering					
PUC Operational Domain (Refer to Logical Scoping Diagram)					
VO1 Update CYME Model	Add	O, A	R		
VO2 Survalent Reporting	Add	O, A	R		
VO2.1 Evaluate ADMS Reporting	Add	O, A	R		
VO2.2 Evaluate OMS Reporting	Add	O, A	R		
VO2.3 Evaluate VVO Reporting	Add	O, A	R		
VO3 Evaluate CIS Integration	Add	O, A	R		
VO3.1 CIS Integration Workshop	Add	O, A	R		
VO3.2 CIS Report	Add	O, A	R		
VO4 Evaluate SCADA Data	Add	O, A	R		
VO5 Evaluate ADMS and VVO Options	Add	O, A	R		
VO6 Identify the Virtual Server Requirements	Add	O, A	R		
VO7 Evaluate Cybersecurity	Add	O, A	R		
VO8 IVR	Add	O, A	R		
VO8.1 Plan and Conduct IVR Integration Workshop	Add	O, A	R		
VO8.2 Prepare IVR Integration Report	Add	O, A	R		
VO9 CYME	Add	O, A	R		
VO9.1 Plan and Conduct CYME Integration Workshop	Baseline	O, A	R		
VO9.2 Prepare CYME Integration Report	Baseline	O, A	R		
VO10 Review Enhanced CSR/Customer Toolset	Add	O, A	R		
VO11 Review Lab Facility	Add	O, A	R		
VO12 AMI Integration	Baseline	O, A	R		
VO12.1 AMI Integration Workshop	Baseline	O, A	R		
VO12.2 AMI Integration Report	Baseline	O, A	R		
PUC Field Domain (Refer to Logical Scoping Diagram)					
VF1 Calculate Feeder and 34.5kV Performance (CMI)	Add	O, A	R		
VF2 Field Engineering	Add	O, A	R		
VF2.1 Establish Feeder Zones	Add	O, A	R		
VF2.2 Establish Bellwether Locations	Add	O, A	R		
VF2.3 Standardized Field Equipment Designs	Add	O, A	R		
VF2.3.1 Create Field Equipment Template Design Drawings	Add	O, A	R		
VF2.3.2 Create Standard Feeder Protection Schemes	Add	O, A	R		
VF2.3.3 Create Cellular Equipment Template Design Drawings	Add	O, A	R		
VF2.3.4 Field Devices Template Maintenance Plan	Add	O, A	R		
VF2.4 Perform Load Flow Analysis of Feeders	Add	O, A	R		
VF2.5 Conduct Field Survey	Add	O, A	R		
VF3 Future Reliability and Energy Savings Performance	Add	O, A	R		
VF3.1 Estimate Future VVO Savings	Add	O, A	R		
VF3.2 Estimate Future Reliability Indices	Add	O, A	R		
VF3.3 Estimate Future FDIR Cost	Add	O, A	R		
VF4 Select Feeders (12/24/36/48)	Add	R	A		
VF5 Review Permits and Public Relations	Baseline	O, A	R		
VF5.1 Local Permits	Baseline	O, A	R		
VF5.2 Develop Public Relations	Baseline	O, A	R		
PUC Organizational Domain					
VB1 Organizational Change	Add	A	R		
VB1.1 Establish Business and Functionality Requirements	Add	A	R		
VB1.2 Develop Use Case Requirements	Add	A	R		
VB1.3 Review Roles, Skills, Training, and Organizational Change Needs	Add	A	R		
VB1.3.1 Develop Field Device Training Plan	Add	A	R		
VB1.3.2 Develop Cellular Training Plan	Add	A	R		
VB1.3.3 Develop IVR, ADMS, OMS, FDIR, and VVO Training Plans	Add	A	R		
VB1.4 Develop Communication Requirements	Add	A	R		
VB1.5 Develop Process Transition, Phasing, and Migration Plans	Add	A	R		
VB1.6 Assess Business Readiness	Add	A	R		

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Procurement					
VP1 Quote Major Materials and Equipment	Add	O, A	R		
VP1.1 Quote Survalent Software	Add	O, A	R		
VP1.2 Quote Cellular Equipment	Add	O, A	R		
VP1.3 Quote Field Equipment	Add	O, A	R		
VP1.4 Quote IVR Software	Add	O, A	R		
VP1.5 Quote Server Hardware	Add	R	O		
VP2 Establish Material Management Requirements	Add	O, A	R		
Major Task: Step 2 Engineering					
PUC Operational Domain (Refer to Logical Scoping Diagram)					
EA1 System Integration	Add	O, A	R		
EA1.1 IVR Integration	Add	O, A	R		
EA1.1.1 Design IVR Integration	Add	O, A	R		
EA1.1.2 Develop IVR Integration Software Testing Plan	Add	O, A	R		
EA1.1.3 Develop IVR Integration Training Materials	Add	O, A	R		
EA1.1.4 Develop IVR Integration Maintenance Plan	Add	O, A	R		
EA1.2 CIS Integration	Baseline	O, A	R		
EA1.2.1 Design CIS Integration	Baseline	O, A	R		
EA1.2.2 Develop CIS Integration Software Testing Plan	Baseline	O, A	R		
EA1.2.3 Develop CIS Integration Training Materials	Baseline	O, A	R		
EA1.2.4 Develop CIS Integration Maintenance Plan	Baseline	O, A	R		
EA1.3 CYME Integration	Baseline	O, A	R		
EA1.3.1 Design CYME Integration	Baseline	O, A	R		
EA1.3.2 Develop CYME Integration Software Testing Plan (Placeholder)	Baseline	O, A	R		
EA1.3.3 Develop CYME Integration Training Materials	Baseline	O, A	R		
EA1.3.4 Develop CYME Integration Maintenance Plan	Baseline	O, A	R		
EA1.4 AMI Integration	Baseline	O, A	R		
EA1.4.1 Design AMI Integration	Baseline	O, A	R		
EA1.4.1.1 Finalize Bellwether Meter Selection	Baseline	O, A	R		
EA1.4.1.2 Design AMI Interface	Baseline	O, A	R		
EA1.4.2 Develop AMI Integration Software Testing Plan	Baseline	O, A	R		
EA1.4.3 Develop AMI Integration Training Materials	Baseline	O, A	R		
EA1.4.4 Develop AMI Integration Maintenance Plan	Baseline	O, A	R		
EA2 OMS	Add	O, A	R		
EA2.1 Design OMS	Add	O, A	R		
EA2.2 Design Customer Outage Web Portal	Add	O, A	R		
EA2.3 Design Internal Stakeholder Dashboard	Add	O, A	R		
EA2.4 Design Mobile Crew	Add	O, A	R		
EA2.5 Develop OMS Software Testing Plan	Add	O, A	R		
EA2.6 Develop OMS Training Materials	Add	O, A	R		
EA2.7 Develop OMS Maintenance Plan	Add	O, A	R		
EA3 ADMS	Baseline	O, A	R		
EA3.1 Define DNP3 Design Templates	Baseline	O, A	R		
EA3.2 Develop ADMS Symbol Templates	Baseline	O, A	R		
EA3.3 Additional Templates	Baseline	O, A	R		
EA3.3.1 Define Device Template Point Lists	Baseline	O, A	R		
EA3.3.2 Field Device Template Configurations	Baseline	O, A	R		
EA3.3.2.1 Create Field Device Template Configurations	Baseline	O, A	R		
EA3.3.2.2 Create Cellular Template Configuration	Baseline	O, A	R		
EA3.3.3 Field Equipment Template Testing Plans	Baseline	O, A	R		
EA3.3.3.1 Develop Template Component Testing Plan for Field Equipment	Baseline	O, A	R		
EA3.3.3.2 Develop Template FDIR and VVO Application Testing Plans	Baseline	O, A	R		
EA3.3.3.3 Develop Template Cellular Testing Plan	Baseline	O, A	R		
EA3.3.3.4 Develop Template Communications End-to-End Testing Plan	Baseline	O, A	R		

Sault Smart Grid Project

Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
EA4 SCADA Master	Baseline	O, A	R		
EA4.1 Define SCADA Master Logical Design	Baseline	O, A	R		
EA4.2 Create SCADA Master Displays and Database	Baseline	O	R		
EA4.3 Develop SCADA Master End-to-End Testing Plan	Baseline	O	R		
EA4.4 Develop SCADA and ADMS Software Testing Plan	Baseline	O, A	R		
EA4.5 Develop SCADA and ADMS Master Training Materials	Baseline	O, A	R		
EA4.6 Develop SCADA and ADMS Master Maintenance Plan	Baseline	O, A	R		
EA5 IVR	Add	O, A	R		
EA5.1 Define IVR Logical Design	Add	O, A	R		
EA5.2 Develop IVR Integration	Add	O	R		
EA5.3 Perform IVR Configuration	Add	O	R		
EA5.4 Develop IVR Software Testing Plan	Add	O	R		
EA5.5 Develop IVR Training Materials	Add	O, A	R		
EA5.6 Develop IVR Maintenance Plan	Add	O, A	R		
EA6 Develop Cut-Over Plan	Add	O, A	R		
EA7 Lab Facility	Add	O, A	R		
EA7.1 Design Lab Facility and Test System	Add	O, A	R		
EA7.2 Create Lab Testing Plan	Add	O, A	R		
PUC Substation Domain (Placeholder)					
PUC Field Domain (Refer to Logical Scoping Diagram)					
EF1 Detailed Design for Field Equipment	Baseline	O, A	R		
EF1.1 Create Site-Specific Work Orders	Baseline	O, A	R		
EF1.2 Perform Protection Coordination Studies	Baseline	O, A	R		
EF1.3 Create Configuration Files	Baseline	O, A	R		
EF1.4 Create Component Testing Plans	Baseline	O, A	R		
EF1.5 Create Field Equipment Training Materials	Baseline	O, A	R		
EF1.5.1 Develop Field Device Training Materials	Baseline	O, A	R		
EF1.5.2 Develop Cellular Training Materials	Baseline	O, A	R		
EF2 Design Field Area Network	Baseline	O, A	R		
EF3 Permits and Public Relations	Baseline	R	A		
EF3.1 Obtain Local Permits	Baseline	R			
EF3.2 Perform Public Relations	Baseline	R			
PUC Organizational Domain					
EO1 Organizational Change Management	Add	O	R		
EO1.1 Review In-Scope Processes	Add	O	R		
EO1.2 Prepare Workshop Materials	Add	O	R		
EO1.3 Conduct Workshops	Add	O	R		
EO1.4 Transition to New Operational Processes	Add	O	R		
EO2 Training	Add	O	R		
EO2.1 Perform IVR Integration Training	Add	O	R		
EO2.2 Perform CIS Integration Training	Add	O	R		
EO2.3 Perform CYME Integration Training	Add	O	R		
EO2.4 Perform AMI Integration Training	Add	O	R		
EO2.5 Perform OMS Training	Add	O	R		
EO2.6 Perform Field Equipment Training	Add	O	R		
EO2.7 Perform SCADA and ADMS Master Training	Baseline	O	R		
EO2.8 Perform IVR Training	Add	O	R		
Major Task: Step 2 Procurement					
Purchasing					
PR1 Major Materials and Equipment	Baseline				
PR1.1 Purchase Survalent Software	Baseline	O	R		
PR1.2 Purchase Field Equipment	Baseline	O	R		
PR1.3 Purchase Cellular Equipment	Baseline	O	R		
PR1.4 Purchase IVR Software	Add	O	R		
PR1.5 Purchase Server Hardware	Baseline	R	A		
PR2 Purchase All Other Materials and Equipment	Baseline	R	A		
PR3 Establish and Manage Inventory and Warehouse	Add	O, R	R, O		
PR3.1 Establish and Manage Inventory and Warehouse for Major Materials	Add	O	R		
PR3.2 Establish and Manage Inventory and Warehouse for All Other Materials	Add	R	O		
PR4 Inspect and Verify OEM Specs	Baseline	O	R		

Sault Smart Grid Project

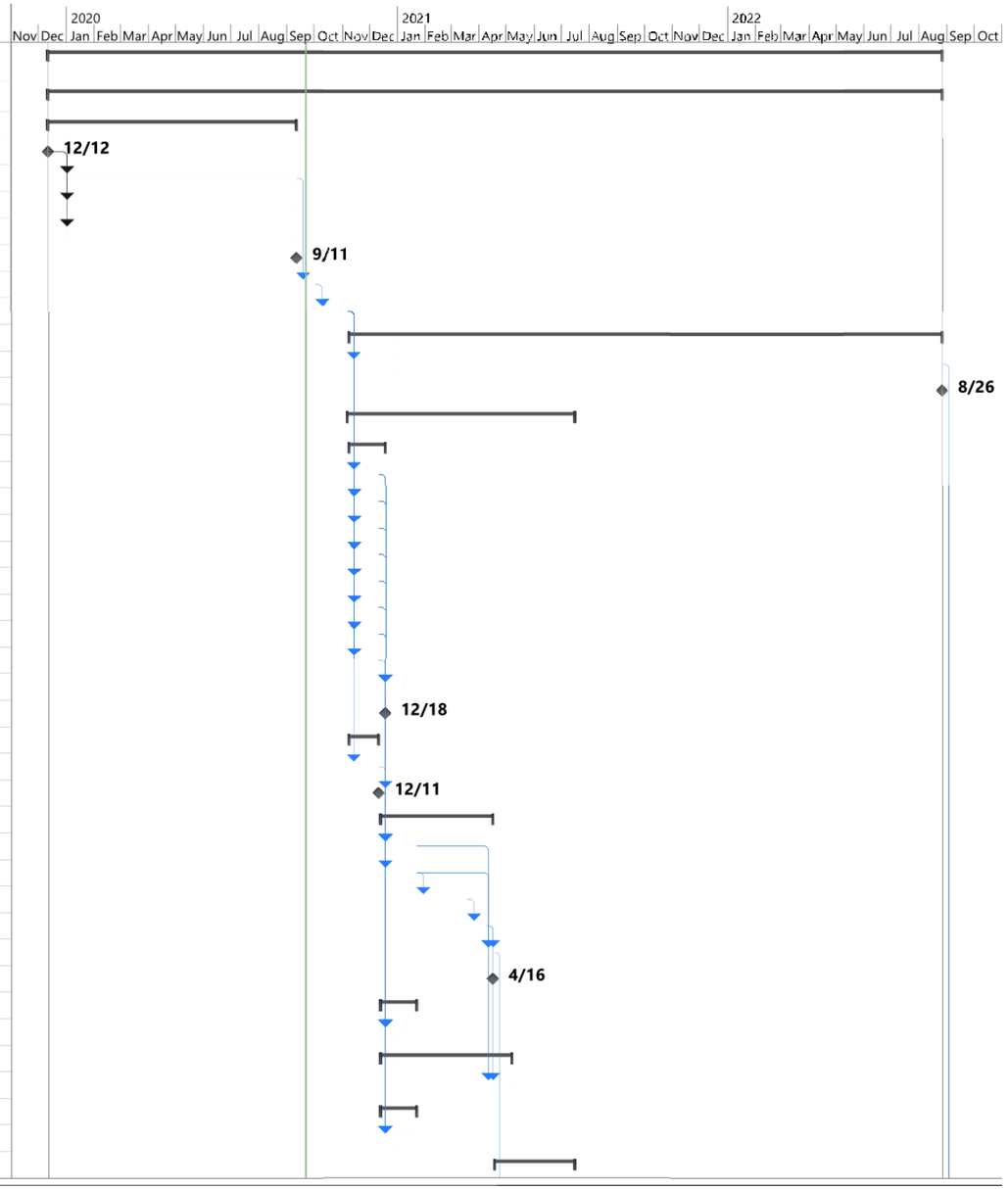
Responsibility Matrix

	Scope	PUC Services	Black & Veatch	Other	Notes
Major Task: Step 1 Engineering					
Staging and Testing					
ST1 Stage Major Systems and Test	Baseline	O, A, R	A, R		
ST1.1 Install the Lab Test System	Add	R, O	A		
ST1.2 Perform Lab Testing	Add	O, A	R		
ST1.3 Delivery of Lab to the PUC	Add	O	R		
ST1.4 Install Lab at the PUC	Add	R			
ST2 Kit and Prepare for Field	Add	O	R		
Major Task: Step 2 Construction/Implementation					
Construction Domain					
CN1 Construction Activities and Management	Baseline	O	R		
CN1.1 Perform Pre-Mobilization/Mobilization Activities	Baseline	O	R		
CN1.2 Create Turnover Packages	Baseline	O	R		
CN1.3 Create Commissioning Plan	Baseline	O	R		
CN1.4 Manage Construction	Baseline	O	R		
CN1.5 Manage Commissioning	Baseline	O	R		
CN1.6 Perform Closeout Activities	Baseline	O	R		
PUC Operational Domain (Refer to Logical Scoping Diagram)					
CO1 Migrate SCADA to ADMS Server	Baseline	O, A	R		
CO2 Construction of the Lab Facility	Baseline	O, A	R		
CO3 Perform Communication Testing	Baseline	O, A	R		
CO4 Cut-Over from Test System to Production System	Baseline	O, A	R		
CO5 Perform IVR Go-Live	Add	O, A	R		
PUC Substation Domain (Refer to Logical Scoping Diagram)					
CS1 Install Communications to and at Substations (placeholder)	Baseline	R	A		
CS2 Update Substation IEDs (placeholder)	Baseline	R	A		
PUC Field Domain (Refer to Logical Scoping Diagram)					
CF1 Install Field Equipment	Baseline	R, A	A, R		
CF1.1 Construct Field Equipment	Baseline	R, A	A, R		
CF1.2 Component Test Field Equipment	Baseline	R, A	A, R		
Major Task: Project Management					
Project Management					
PM1 Project Kickoff Meeting	Baseline		R		
PM1.1 Organizational Structure	Add		R		
PM1.2 Staffing and Resources	Add		R		
PM1.3 Stakeholders	Add		R		
PM1.4 Reporting Methodology	Add		R		
PM1.5 Schedule	Add		R		
PM1.6 Scope and Change Management	Add		R		
PM1.7 Communications Plan	Add		R		
PM2 Management Status Meetings	Add		R		
PM3 Project Steering Committee Meetings	Add		R		
PM4 Change Management	Add		R		
PM5 Overall Schedule, Phases, and Milestones	Baseline		R		
PM5.1 Overall Project Schedule	Baseline		R		
PM5.2 Engineering Schedule	Add		R		
PM5.3 Procurement Schedule	Add		R		
PM5.4 Construction Schedule	Add		R		
PM5.5 Schedule Consolidation	Add		R		
PM5.6 Execution Logistics: Scheduling access, safety escorts, Training	Add		R		
PM6 Risk Management	Add		R		
PM7 Budget Planning & Forecasting	Baseline		R		
PM8 Quality Assurance	Baseline		R		
PM9 Project Execution Plan (PEP)	Add		R		

R = Responsible; A = Assist; O=Oversight (includes Review/Approve), TBD=To Be Determined

Schedule 2 – Sault Smart Grid Schedule

ID	Task Name	Duration	Start	Finish
1	**PUC Sault Smart Grid Project**	**707 days**	**Thu 12/12/19**	**Fri 8/26/22**
2	**Step 1: Smart Start & Contract Negotiations**	**707 days**	**Thu 12/12/19**	**Fri 8/26/22**
3	**SMARTStart**	**197 days**	**Thu 12/12/19**	**Fri 9/11/20**
4	Award Notification	0 days	Thu 12/12/19	Thu 12/12/19
5	Contract Agreement Negotiations	182 days	Thu 1/2/20	Fri 9/11/20
6	Scope & Price Development & Reviews	182 days	Thu 1/2/20	Fri 9/11/20
7	Project Execution Plan	182 days	Thu 1/2/20	Fri 9/11/20
8	**Expenses**	**0 days**	**Fri 9/11/20**	**Fri 9/11/20**
12	Execute Contract	15 days	Mon 9/14/20	Fri 10/2/20
13	NTP-Upfront Engineering	25 days	Mon 10/5/20	Fri 11/6/20
14	**PMO**	**470 days**	**Mon 11/9/20**	**Fri 8/26/22**
15	Project Management	470 days	Mon 11/9/20	Fri 8/26/22
16	**Expenses**	**0 days**	**Fri 8/26/22**	**Fri 8/26/22**
20	**Step 1: Upfront Engineering**	**180 days**	**Fri 11/6/20**	**Fri 7/16/21**
21	**PUC Operational Domain Tasks**	**30 days**	**Mon 11/9/20**	**Fri 12/18/20**
22	VO1 Update CYME Model-P	25 days	Mon 11/9/20	Fri 12/11/20
23	VO2 Evaluate Survalent Reporting	25 days	Mon 11/9/20	Fri 12/11/20
24	VO3 Evaluate CIS Integration	25 days	Mon 11/9/20	Fri 12/11/20
25	VO4 Evaluate SCADA Data	25 days	Mon 11/9/20	Fri 12/11/20
26	VO5 Evaluate ADMS and VVO Options	25 days	Mon 11/9/20	Fri 12/11/20
27	VO6 Develop ADMS, OMS, and VVO Training Scope and Schedule	25 days	Mon 11/9/20	Fri 12/11/20
28	VO7 Identify the Virtual Server Requirements	25 days	Mon 11/9/20	Fri 12/11/20
29	VO8 Evaluate Cyber Security	25 days	Mon 11/9/20	Fri 12/11/20
30	Review	5 days	Mon 12/14/20	Fri 12/18/20
31	**Expenses**	**0 days**	**Fri 12/18/20**	**Fri 12/18/20**
35	**Subcontractor**	**25 days**	**Mon 11/9/20**	**Fri 12/11/20**
36	Survalent	25 days	Mon 11/9/20	Fri 12/11/20
37	Performance Modeling-BV	0 days	Fri 12/11/20	Fri 12/11/20
38	**PUC Field Domain Tasks**	**90 days**	**Mon 12/14/20**	**Fri 4/16/21**
39	VF1 Calculate Feeder and 34.5kV Performance (CMI)	30 days	Mon 12/14/20	Fri 1/22/21
40	VF2 Field Engineering: Feeders 1-48	30 days	Mon 12/14/20	Fri 1/22/21
41	VF3 Estimate Future Reliability and Energy Savings Performance-P	40 days	Mon 1/25/21	Fri 3/19/21
42	VF4 Select Feeders (12/24/36/48)	15 days	Mon 3/22/21	Fri 4/9/21
43	Review	5 days	Mon 4/12/21	Fri 4/16/21
44	**Expenses**	**0 days**	**Fri 4/16/21**	**Fri 4/16/21**
48	**Subcontractor**	**30 days**	**Mon 12/14/20**	**Fri 1/22/21**
49	Performance Modeling-BV	30 days	Mon 12/14/20	Fri 1/22/21
50	**PUC Organizational Domain Tasks**	**105 days**	**Mon 12/14/20**	**Fri 5/7/21**
51	VB1 Assess Organizational Change & Review	20 days	Mon 4/12/21	Fri 5/7/21
52	**Subcontractor**	**30 days**	**Mon 12/14/20**	**Fri 1/22/21**
53	Change Management Consultant-MC	30 days	Mon 12/14/20	Fri 1/22/21
54	**Procurement: Balance of Work Price Development**	**65 days**	**Mon 4/19/21**	**Fri 7/16/21**



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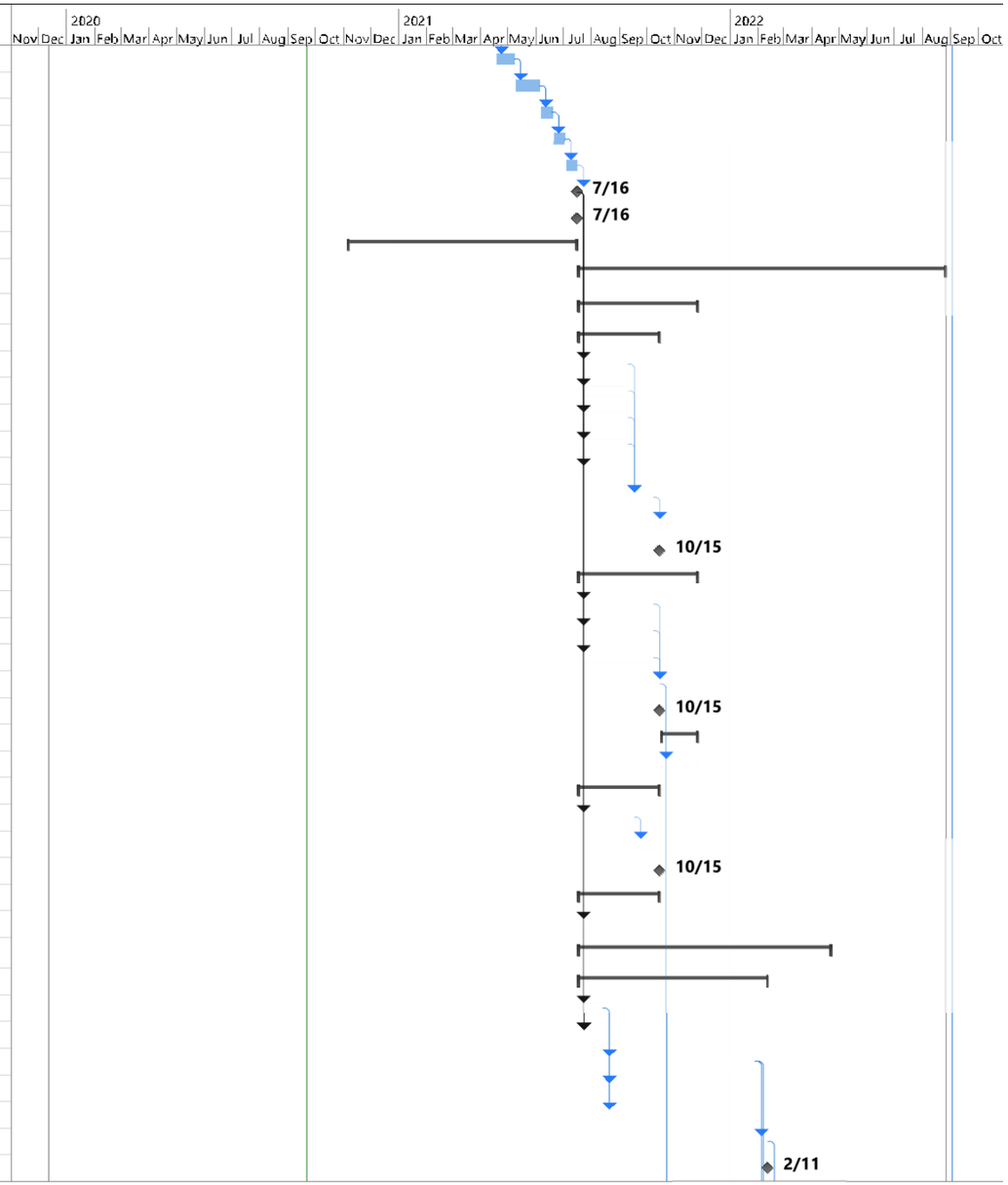
Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

ID	Task Name	Duration	Start	Finish
55	VP1 Develop Construction Packages & Specifications	15 days	Mon 4/19/21	Fri 5/7/21
56	VP1 Submit Construction Packages for Bid/Quotes to Contractors & Suppliers	20 days	Mon 5/10/21	Fri 6/4/21
57	Review Bid Packages	10 days	Mon 6/7/21	Fri 6/18/21
58	Develop Firm Price	10 days	Mon 6/21/21	Fri 7/2/21
59	Review with PUC, and Finalize Balance of Work Price	10 days	Mon 7/5/21	Fri 7/16/21
60	Owner Submits NTP for Balance of Work to Contractor	0 days	Fri 7/16/21	Fri 7/16/21
61	**Expenses**	**0 days**	**Fri 7/16/21**	**Fri 7/16/21**
65	**Other Expenses**	**180 days**	**Fri 11/6/20**	**Fri 7/16/21**
68	**Step 2: Balance of Work**	**290 days**	**Mon 7/19/21**	**Fri 8/26/22**
69	**Step 2: Engineering**	**95 days**	**Mon 7/19/21**	**Fri 11/26/21**
70	**PUC Operational Domain Tasks**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
71	EA1 System Integration	40 days	Mon 7/19/21	Fri 9/10/21
72	EA2 OMS	40 days	Mon 7/19/21	Fri 9/10/21
73	EA3 ADMS	40 days	Mon 7/19/21	Fri 9/10/21
74	EA4 SCADA Master	40 days	Mon 7/19/21	Fri 9/10/21
75	EA5 IVR	40 days	Mon 7/19/21	Fri 9/10/21
76	EA6 Cut-Over Plans	20 days	Mon 9/13/21	Fri 10/8/21
77	Review	5 days	Mon 10/11/21	Fri 10/15/21
78	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
82	**PUC Field Domain Tasks**	**95 days**	**Mon 7/19/21**	**Fri 11/26/21**
83	EF1 VVO & DA Detailed Design (1-48)	60 days	Mon 7/19/21	Fri 10/8/21
84	EF2 Design VV0 DA Field Area Network	60 days	Mon 7/19/21	Fri 10/8/21
85	EF3 Siting/Permitting	60 days	Mon 7/19/21	Fri 10/8/21
86	Review	5 days	Mon 10/11/21	Fri 10/15/21
87	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
91	**Subcontractor**	**30 days**	**Mon 10/18/21**	**Fri 11/26/21**
92	Protection Analysis-BV	30 days	Mon 10/18/21	Fri 11/26/21
93	**PUC Organizational Domain Tasks**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
94	EO1 Organizational Change Management	45 days	Mon 7/19/21	Fri 9/17/21
95	EO2 Training	15 days	Mon 9/20/21	Fri 10/8/21
96	**Expenses**	**0 days**	**Fri 10/15/21**	**Fri 10/15/21**
99	**Subcontractor**	**65 days**	**Mon 7/19/21**	**Fri 10/15/21**
100	Change Management Consult MC	65 days	Mon 7/19/21	Fri 10/15/21
101	**Step 2: Procurement**	**200 days**	**Mon 7/19/21**	**Fri 4/22/22**
102	**Purchase Equipment**	**150 days**	**Mon 7/19/21**	**Fri 2/11/22**
103	Negotiate Supplier Contracts	20 days	Mon 7/19/21	Fri 8/13/21
104	Negotiate Sub-Contractor Contracts	20 days	Mon 7/19/21	Fri 8/13/21
105	PR1 Order Long Lead Equipment: Regulators, Reclosers, etc.	120 days	Mon 8/16/21	Fri 1/28/22
106	PR2 Order Materials: Poles, Make Ready, etc	40 days	Mon 8/16/21	Fri 10/8/21
107	PR3 Warehouse & Inventory	50 days	Mon 8/16/21	Fri 10/22/21
108	PR4 Inspect & Verify OEM Equipment & Specs	10 days	Mon 1/31/22	Fri 2/11/22
109	**Expenses**	**0 days**	**Fri 2/11/22**	**Fri 2/11/22**



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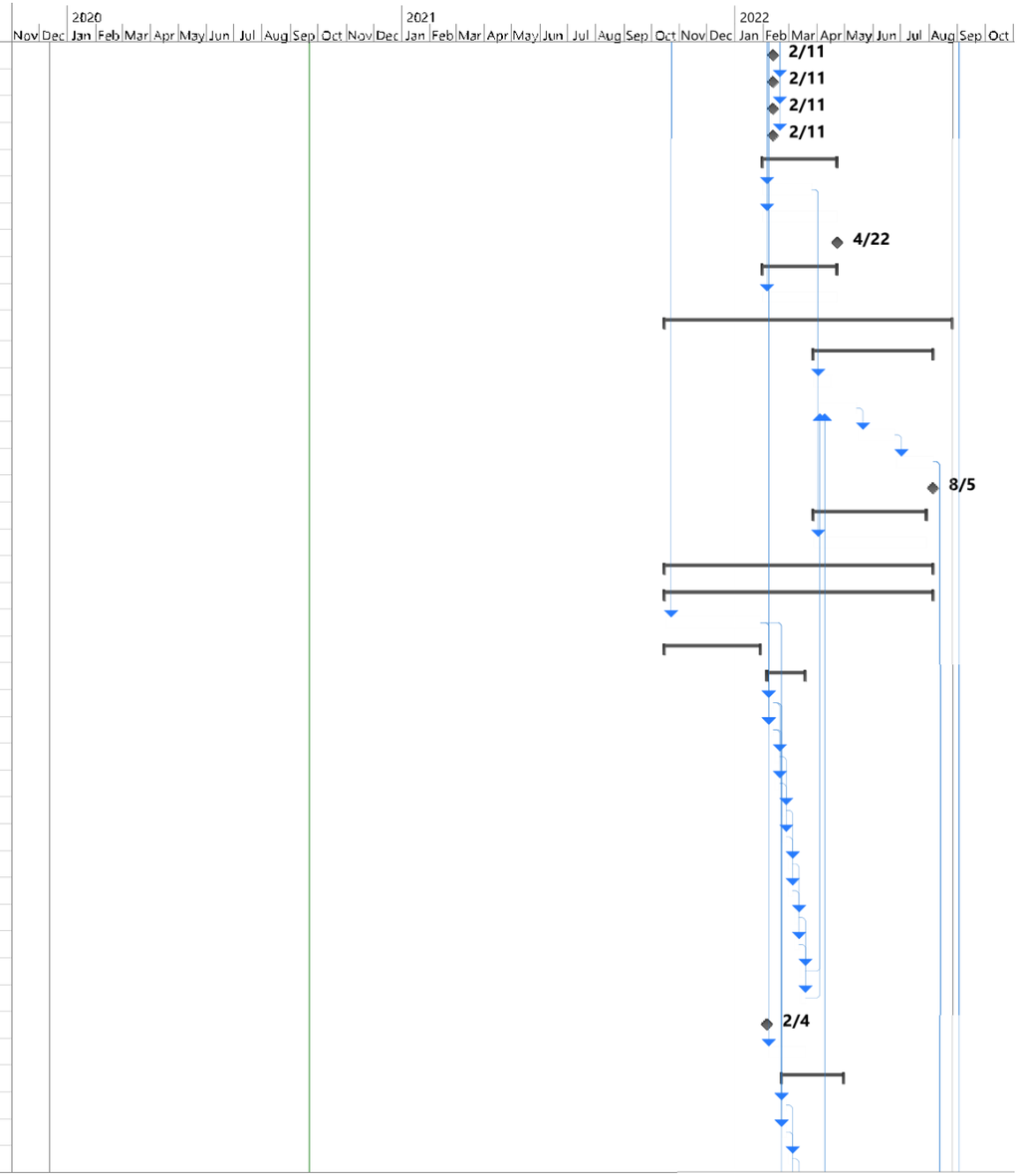
Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

ID	Task Name	Duration	Start	Finish
112	**Equipment & Materials**	**0 days**	**Fri 2/11/22**	**Fri 2/11/22**
113	Survalent Equipment and Services	0 days	Fri 2/11/22	Fri 2/11/22
114	Major Equipment	0 days	Fri 2/11/22	Fri 2/11/22
115	Misc Materials	0 days	Fri 2/11/22	Fri 2/11/22
116	**Staging, Kitting and Testing Tasks**	**60 days**	**Mon 1/31/22**	**Fri 4/22/22**
117	ST1 Stage Major Systems and Test	40 days	Mon 1/31/22	Fri 3/25/22
118	ST2 Kit and Prepare for Field	60 days	Mon 1/31/22	Fri 4/22/22
119	**Expenses**	**0 days**	**Fri 4/22/22**	**Fri 4/22/22**
123	**Subcontractor**	**60 days**	**Mon 1/31/22**	**Fri 4/22/22**
124	Subcontractor 1	60 days	Mon 1/31/22	Fri 4/22/22
125	**Step 2: Construction**	**225 days**	**Fri 10/15/21**	**Fri 8/26/22**
126	**PUC Operational Domain Tasks**	**95 days**	**Mon 3/28/22**	**Fri 8/5/22**
127	CO1 Construction of Test System	15 days	Mon 3/28/22	Fri 4/15/22
128	CO2 Survalent SCADA End-to-End Testing	30 days	Mon 4/4/22	Fri 5/13/22
129	CO3 Cut-Over from Test System to Production System	30 days	Mon 5/16/22	Fri 6/24/22
130	CO4 IVR Go-Live	30 days	Mon 6/27/22	Fri 8/5/22
131	**Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
135	**Subcontractor**	**90 days**	**Mon 3/28/22**	**Fri 7/29/22**
136	Survalent	90 days	Mon 3/28/22	Fri 7/29/22
137	**PUC Field Domain Tasks**	**210 days**	**Fri 10/15/21**	**Fri 8/5/22**
138	**CF1 Install Field VVO & DA Equipment**	**210 days**	**Fri 10/15/21**	**Fri 8/5/22**
139	Make Ready Work	75 days	Mon 10/18/21	Fri 1/28/22
140	**Expenses**	**75 days**	**Fri 10/15/21**	**Fri 1/28/22**
144	**Substation VVO Feeders 1-48 Install/Functional & Substantial Testing**	**30 days**	**Fri 2/4/22**	**Fri 3/18/22**
145	Sub 1 Feeders 1-4	5 days	Mon 2/7/22	Fri 2/11/22
146	Sub 2 Feeders 1-4	5 days	Mon 2/7/22	Fri 2/11/22
147	Sub 3 Feeders 1-4	5 days	Mon 2/14/22	Fri 2/18/22
148	Sub 4 Feeders 1-4	5 days	Mon 2/14/22	Fri 2/18/22
149	Sub 5 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
150	Sub 6 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
151	Sub 7 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
152	Sub 8 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
153	Sub 9 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
154	Sub 10 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
155	Sub 11 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
156	Sub 12 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
157	**Expenses**	**0 days**	**Fri 2/4/22**	**Fri 2/4/22**
161	Subcontractor 1	30 days	Mon 2/7/22	Fri 3/18/22
162	**Substation DA Feeders 1-48 Install/Functional & Substantial Testing**	**50 days**	**Mon 2/21/22**	**Fri 4/29/22**
163	Sub 1 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
164	Sub 2 Feeders 1-4	5 days	Mon 2/21/22	Fri 2/25/22
165	Sub 3 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22



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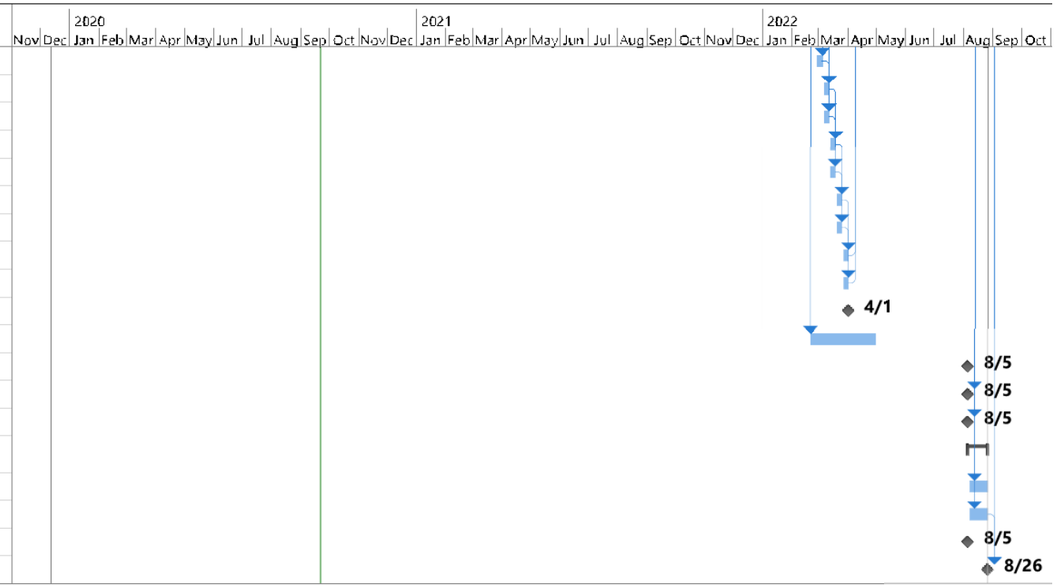
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

ID	Task Name	Duration	Start	Finish
166	Sub 4 Feeders 1-4	5 days	Mon 2/28/22	Fri 3/4/22
167	Sub 5 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
168	Sub 6 Feeders 1-4	5 days	Mon 3/7/22	Fri 3/11/22
169	Sub 7 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
170	Sub 8 Feeders 1-4	5 days	Mon 3/14/22	Fri 3/18/22
171	Sub 9 Feeders 1-4	5 days	Mon 3/21/22	Fri 3/25/22
172	Sub 10 Feeders 1-4	5 days	Mon 3/21/22	Fri 3/25/22
173	Sub 11 Feeders 1-4	5 days	Mon 3/28/22	Fri 4/1/22
174	Sub 12 Feeders 1-4	5 days	Mon 3/28/22	Fri 4/1/22
175	**Expenses**	**0 days**	**Fri 4/1/22**	**Fri 4/1/22**
179	Subcontractor 2	50 days	Mon 2/21/22	Fri 4/29/22
180	**Other Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
181	Corporate Taxes	0 days	Fri 8/5/22	Fri 8/5/22
182	Work Permits	0 days	Fri 8/5/22	Fri 8/5/22
183	**Project CloseOut & Final Completion**	**15 days**	**Fri 8/5/22**	**Fri 8/26/22**
184	Punch List Items	15 days	Mon 8/8/22	Fri 8/26/22
185	As-Builts & Final Completion	15 days	Mon 8/8/22	Fri 8/26/22
186	**Expenses**	**0 days**	**Fri 8/5/22**	**Fri 8/5/22**
190	Project Complete	0 days	Fri 8/26/22	Fri 8/26/22



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Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
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Summary	Inactive Summary	Manual Summary	External Milestone		

Appendix AA3-7: EPC Appendix B – Compensation

APPENDIX B – COMPENSATION

Article 1 - Definitions

1.1 The following terms, wherever capitalised in the *Contract*, or in any document produced pursuant to the terms of the *Contract*, shall have the following meanings:

(a) *Contractor's Fee* is an amount equal to [redacted]

(b) *Cost Estimate for Balance of Work* means an estimate prepared by the *Contractor* with a level of precision based on the degree of completion of the *Engineering Services* at the time; presented in elemental format; and composed of the *Cost of Work*, the *Contractor's Fee*, cash allowances, contingencies, and allowances for design, escalation, market conditions, as applicable;

(c) *Cost of Work* means the actual cost incurred or to be incurred by the *Contractor* in performing the *Balance of Work*, a *Change Order* or a *Change Directive* and is limited to the actual cost of the following:

(i) the cost of personnel in the direct employ of the *Contractor* in accordance with the schedule of hourly rates agreed upon by the *Owner* and the *Contractor*, which shall be inclusive of all salaries, wages and benefits, as well as all contributions, assessments and taxes incurred for such items as employment insurance, provincial or territorial health insurance, workers' compensation, and Canada or Quebec Pension Plan based on wages, salaries or other remuneration paid to employees of the *Contractor*;

(ii) all *Goods* including cost of transportation thereof;

(iii) materials, supplies, construction equipment, temporary work, and hand tools not owned by the workers, including transportation and maintenance thereof, which are consumed in the performance of the *Work*; the cost less salvage value on such items used, but not consumed, which remain the property of the *Contractor*;

(iv) all tools and *Construction Equipment*, exclusive of hand tools used in the performance of the *Work*, whether rented from or provided by the *Contractor* or others, including installation, minor repairs and replacements, dismantling, removal, transportation, and delivery cost thereof;

(v) deposits lost provided that they are not caused by negligent acts or omissions of the *Contractor* and the *Work* is performed in accordance with this *Contract*;

(vi) the amounts of all written agreements with *Subcontractors*;

(vii) quality assurance such as independent inspection and testing services as required by the *Owner's Requirements*, the *Quality Plan* or the *Inspection and Testing Plan*;

(viii) charges levied by authorities having jurisdiction over the *Work* other than those arising out of the acts or omissions of the *Contractor* or those for whom the *Contractor* is in law responsible;

(ix) premiums for all contract securities and insurance that the *Construction Manager* is required, by the *Contract*, to purchase and maintain; for clarity, the *Cost of Work* does not include the cost of any letter of credit provided by the *Contract*, at its option, under Section 4.1;

(x) all taxes, other than Harmonized Sales Tax, and duties relating to the Work for which the *Contractor* is liable in relation to the performance of the Work other than those relating to the *Contractor*'s income, real or personal property or employees or payroll;

(d) *Fixed Price* is the amount equal to the sum of the *Upfront Engineering Fixed Price* and the *Balance of Work Fixed Price*, being the full and complete compensation for the *Work*, in accordance with the parameters set forth in this Appendix B – Compensation, as adjusted by any *Change Order* or *Change Directive*;

(e) *Maximum Price* is $27,745,044, as adjusted by any *Change Order* or *Change Directive*;

(f) *Open-to-Closed-Book Process* means the process described in Schedule 2 for reaching agreement on the *Balance of Work Fixed Price*;

(g) *Upfront Engineering Fixed Price* is $5,086,378, as adjusted by any *Change Order* or *Change Directive*;

Table 1: Breakdown of Maximum Price

Sault Smart Grid Project		
Description	**Step**	**Price (CAD-$)**
Upfront Engineering	1	
Engineering		
PUC Operational Domain Tasks	1	$ [redacted]
PUC Field Domain Tasks	1	$
PUC Organizational Domain Tasks	1	$
Procurement Firm Price Tasks	1	$
SMARTStart	1	$
PMO	1	$
Other Expenses: Taxes	1	$
Total: PMO + SMARTStart + Upfront Engineering[1]	1	$ 5,086,378
Balance of Work	2	
Balance of Work-Engineering		
PUC Operational Domain Tasks	2	$ [redacted]
PUC Field Domain Tasks	2	$
PUC Organizational Domain Tasks	2	$
Balance of Work-Procurement	2	$
Purchasing Equipment & Tasks	2	$
Staging and Testing Tasks	2	$
Balance of Work-Construction & Implementation		$
PUC Operational Domain Tasks	2	$
PUC Field Domain Tasks	2	$
Total: Balance of Work[2]	2	$
Maximum Price	1,2	$ 27,745,044

Article 2 - Compensation

2.1 As full and complete compensation for the *Upfront Engineering Services*, the *Owner* shall pay the *Contractor* the *Upfront Engineering Fixed Price* in accordance with Article 3 – Applications for Payments on Account.

2.2 As full and complete compensation for the *Balance of Work*, the *Owner* shall pay the *Contractor* the *Balance of Work Fixed Price* in accordance with *Price* in accordance with Article 3 – Applications for Payments on Account.

2.3 The *Cost of Work* does not include any cost or expense relating to

(a) the negligence, unlawful conduct or wilful misconduct of the *Contractor*, a *Subcontractor* or anyone directly or indirectly employed or engaged by any of them or for whom any of them may be liable;

(b) the failure of the any of the persons described in paragraph 2.5(a) to exercise reasonable care and diligence in their attention to the Work;

(c) *Deficiencies* or other improperly performed *Work*;

(d) any costs noted in the *Contract* as non-reimbursable by the *Owner* or paid or incurred at the *Contractor*'s expense.

2.4 In accordance with the *Open-to-Closed-Book Process*, all cash discounts and rebates and refunds shall accrue to the *Owner*, including, without limitation, all returns from sale of surplus materials and equipment applicable to the *Work*, and the *Contractor* shall make provisions so that they can be secured without delay.

2.5 The *Contractor's* personnel rates for time and material *Work* are set out in Schedule 1 – Rate Sheet to this Appendix B – Compensation. The *Contractor* represents that such rates (among others) have been used to build up the estimate on which the *Maximum Price* is based. Such rates shall be used to value adjustments to the *Fixed Price* under the *Contract*, including *Work* performed under a *Change Directive*. Where such rates are inapplicable, the parties will use a transparent, open-book process to negotiate adjustments to the *Fixed Price*, which will, to the extent applicable, be based on the price breakdown provided in the *Cost Estimate for Balance of Work* on which the *Fixed Price* was based.

Table 2: Payment Milestones

Payment Milestones		
[redacted]		

Article 3 - Applications for Payments on Account

3.1 Applications for payment on account of the *Upfront Engineering Fixed Price* and the *Balance of Work Fixed Price*, as applicable, may be made as the payment milestones set out in Table 2 are achieved.

3.2 In the event of time and materials work, applications for payment shall be dated the last day of each payment period, which is the last day of the month or an alternative day of the month agreed in writing by the parties.

3.3 The amount claimed shall be for the value associated with the payment milestones achieved, as of the last day of the payment period, in accordance with Table 2. For payment milestones under Step 1: Upfront Engineering of Table 2, the % Payment of Total Price column refers to a percentage of the *Upfront Engineering Fixed Price*. For payment milestones under Step 2: Balance of Work of Table 2, the % Payment of Total Price column refers to a percentage of the *Balance of Work Fixed Price*

3.4 Where the *Contract* does not set out payment milestones, such as for *Work* performed under a *Change Order* or *Change Directive*, the *Contractor* shall submit to the *Owner*, at least 15 calendar days before the first application for payment, a schedule of values for the parts of the *Work*, aggregating the total amount of the relevant *Compensation* or, as applicable, the estimated *Compensation*, so as to facilitate evaluation of applications for payment. For certainty, a schedule of milestone payments shall be considered a schedule of values the purposes of the *Contract*.

3.5 The criteria for the achievement of payment milestones and schedule of values shall be made out in such form and supported by such evidence as the *Owner* may reasonably require and, when accepted by the *Owner*, shall be used as the basis for applications for payment, unless it is found to be in error.

3.6 The *Contractor* shall include a statement based on criteria for the achievement of payment milestones and the schedule of values, as applicable, with each application for payment.

3.7 Applications for payment for *Goods* delivered to the *Work Site* but not yet incorporated into the *Work* shall only be permitted if specified in the *Owner's Requirements* and shall be supported by such evidence as the *Owner* may reasonably require to establish the value and delivery of the *Goods*.

3.8 It shall be a condition of the first payments on account of the *Upfront Engineering Fixed Price* and *Balance of the Work Fixed Price*, respectively, that the *Contractor* has provided the *Owner* confirmation of insurance coverage or, in the case of project-specific policies, certified true copies of policies of insurance, as may be required by the *Contract* or any *Notice to Proceed*, and has provided the *Owner* and *Consultant* a clearance certificate from the WSIB (Ontario).

3.9 It shall be a condition of the second and subsequent payments on account of the *Upfront Engineering Fixed Price* and *Balance of the Work Fixed Price*, respectively, that the *Contractor* has provided to the *Owner* and *Consultant*

(a) a statutory declaration in the form included in Appendix F – Forms stating that all wages and *Subcontractors* have been paid toward the performance of the *Work*; and

(b) a declaration that the *Contractor* is not aware of any lien having been preserved (by registration or otherwise) or any written notice of lien having been delivered in relation to the *Work* or the *Contract* other than those of which the *Contractor* has given written notice to the *Owner* and which the *Contractor* is actively taking steps to remove, vacate or effect the withdrawal of in accordance with its obligations under the *Contract*.

(c) a clearance certificate from the WSIB (Ontario).

3.10 The parties acknowledge that an application for payment must meet the requirements of a "proper invoice" under the Construction Act (Ontario).

3.11 Where the *Contract* sets out a schedule of milestone payments, the *Contractor* shall only be entitled to make applications for payment on achievement of the associated payment milestones and not on the basis of progress of the *Work*.

3.12 The *Contractor* shall not be entitled to submit an application for payment for *Work* in respect of which the *Contract* requires testing or commissioning until such testing or commissioning has been successfully passed or achieved.

3.13 Where the *Owner* has amended an application for payment or the *Owner* otherwise disputes an application for payment, the *Owner* may refuse to pay the disputed portion of the amount requested under the application for payment if, no later than 14 days after receipt by the *Owner* of the application for payment, the *Owner* gives the *Contractor* a notice of non-payment, in the form and manner prescribed by the Construction Act (Ontario), specifying the amount not being paid and detailing all of the reasons for non-payment.

3.14 The Owner shall make payment to the *Contractor* on account on or before 28 calendar days after the later of:

(a) receipt by the *Owner* and *Consultant* of the application for payment, or

(b) the last day of the monthly payment period for which the application for payment is made.

Article 4 - Construction Act Holdback

4.1 The *Owner* shall retain from all payments due and payable to the *Contractor* an amount equal to 10% of the value of the *Work* actually done and materials furnished by the *Contractor* in accordance with the Construction Act (Ontario). At the option of the *Contractor*, the *Owner* shall retain the holdback in the form of a letter of credit provided by the *Contractor* in the prescribed form. The *Contractor* may provide a letter of credit with each application for payment or at such other frequency as the *Owner* and *Contractor* may agree, each acting reasonably.

4.2 If:

(a) a subcontract has been certified complete under the Construction Act (Ontario); and

(b) all liens in respect of the completed subcontract have expired or been satisfied, discharged or otherwise provided for under the Construction Act (Ontario);

the amount that the *Owner* shall retain under Section 4.1 shall be reduced by the amount of holdback the *Owner* has retained in respect of the completed subcontract, not to exceed 10% of the price of the subcontract.

4.3 In Ontario, the holdback amount authorized by the certificate for payment of the holdback amount is due and payable on the 61st calendar day following the date on which a copy of the certificate or declaration of substantial performance of the *Work* has been published as provided in section 32 of the Construction Act (Ontario), provided that there are no preserved liens in respect of the *Contract* or the *Work*. The *Owner* may refuse to pay some or all of the holdback amount, in accordance with this *Contract*, if the *Owner* publishes a notice in the form prescribed by the Construction Act (Ontario) specifying the amount of the holdback that the *Owner* refuses to pay, and the notice is published in the manner set out in the regulations no later than 40 days after the date on which a copy of the certificate or declaration of substantial performance of the *Work* has been published as provided in section 32 of the Construction Act (Ontario).

4.4 In order to provide evidence there are the no preserved liens in respect of the *Contract* or the *Work*, the *Contractor* shall perform and deliver to the *Owner* a parcel register search (or searches) for the *Place of the Work* on the 61st calendar day following the date on which a copy of the certificate or declaration of substantial performance of the *Work* has been published as provided in section 32 of the Construction Act (Ontario).

Article 5 - Withholding of Payment

5.1 Without limiting any other right or remedy the *Owner* may have, including any other right of set-off or withholding, the *Owner* may withhold payment for the following reasons in an amount reasonably necessary to protect the *Owner*:

(a) a lien has been preserved against the *Work Site* or the *Owner* has received a written notice of lien in relation to the *Work* or this *Contract* in accordance with the Construction Act (Ontario);

(b) a third party has issued a formal demand or claim in respect of matter against which the *Contractor* has agreed to indemnify the *Owner* under the *Contract* and the *Contractor* has not taken reasonable steps to defend the claim or has failed to submit a claim in accordance with any applicable insurance policy;

(c) the *Contractor* has caused damage to property for which the *Contractor* is responsible under the *Contract* and the *Contractor* has not taken reasonable steps to make good the damage or otherwise to make the owner of the property whole, or has failed to submit a claim in accordance with any applicable insurance policy;

(d) the *Contractor* has failed to correct a default in accordance with Section 36.4 of the main body of the *Contract*;

(e) after reasonable notice, the *Contractor* has not demonstrated to the reasonable satisfaction of the *Owner* that it has sufficient financial and other resources or commitment to complete the *Work*.

Article 6 - Fixed Price

6.1 The parties acknowledge their mutual intent that the *Fixed Price* shall not exceed the *Maximum Price.* As set forth in Section 6.3(c), the parties further acknowledge that the description of the *Balance of Work* set out in Appendix A – SSG Scope of Work is preliminary and does not represent a commitment by *Contractor* to deliver such scope of work to *Owner* for the estimated *Balance of Work Fixed Price*.

6.2 The *Maximum Price* has been developed by the *Contractor* based on a *Cost Estimate for Balance of Work*, assuming a U.S. dollar to Canadian dollar exchange rate of 1.33 and no applicable tariffs. The *Maximum Price* has been broken down in Table 1 above.

6.3 As part of the *Upfront Engineering Services*:

(a) the *Contractor* will prepare revised *Cost Estimates for Balance of Work*, using the *Open-to-Close-Book Process* as the *Owner's Requirements* are developed; and

(b) the revised *Cost Estimate for Balance of Work* will be a Class B estimate, being an elemental cost analysis based on design development drawings and outline specifications, which include the design of all major systems and subsystems, as well as the results of site field visits to verify existing conditions above grade;

(c) if a *Cost Estimate for Balance of Work* exceeds the *Maximum Price*, the *Contractor* will work with the *Owner* to determine cost-saving measures, which may include revisions to the *Owner's Requirements*, such as value engineering, or reducing the scope of work in order to meet the *Maximum Price*.

6.4 The parties will negotiate in good faith to execute the *Notice to Proceed with Balance of Work* as soon as reasonably possible following the completion of the *Upfront Engineering Services*. If at any point after the *Contractor's* submission of a revised *Cost Estimate for Balance of Work*, the *Contractor* is of the view that the *Notice to Proceed with Balance of Work* will not be executed promptly, including because of the failure to satisfy the condition precedent set out in Section 12.5 of the main body of the *Contract*, it may give notice of same to the *Owner*. If the *Notice to Proceed with Balance of Work* is not executed within 90 days of such notice, and the *Contract* is not terminated for the *Owner's* convenience under Section 35.1 of the main body of the *Contract*, the *Contractor* may terminate the *Contract* under Section 35.2 of the main body of the *Contract*.

6.5 The *Upfront Engineering Fixed Price* includes the *Contractor's* costs for the preparation of the *Cost Estimate for Balance of Work* and negotiation of the *Notice to Proceed with Balance of Work*; provided that the *Contractor* shall bear its own legal costs for the negotiation of the *Notice to Proceed with Balance of Work*.

Schedule 1 – Rate Sheet

CONTRACTOR CARD: EPC AGREEMENT	CAD	CAD	CAD
Position – Level of Resource	2019	2020	2021
Management			
Engineering			

CONTRACTOR CARD: EPC AGREEMENT	CAD	CAD	CAD
[redacted]			
Site Acquisition			
[redacted]			

CONTRACTOR CARD: EPC AGREEMENT	CAD	CAD	CAD
[redacted]			
Construction Management	[redacted]	[redacted]	[redacted]
[redacted]			
Procurement	[redacted]	[redacted]	[redacted]
[redacted]			
Services/Other	[redacted]	[redacted]	[redacted]
[redacted]			
Safety	[redacted]	[redacted]	[redacted]
[redacted]			

Schedule 2 – Open-to-Closed-Book Process

This Schedule 2 is intended as a description of the process the parties currently intend to follow in their negotiation to agree on the *Fixed Price* and does not in any way affect the rights and obligations of the parties set out in the *Contract*.

The following describes the open to closed book approach to develop a firm price for the Upfront Engineering & Balance of the Work.

- Upfront Engineering-Contractor to perform the site walks, engineering, bill of materials & develop the engineering packages for a fixed price based upon mutually agreed hours, rates and expenses per Appendix A SSG Scope of Work. The engineering would be developed by Contractor to a level of completion that provides enough information to estimate the Balance of the Work (Engineering, Purchase equipment, Construction) for a firm price. A project execution plan would also be finalized during the Upfront Engineering to confirm the scope and deliverables for the Balance of the Work for the fixed Maximum Price.

- The Balance of the Work scope will be developed using the engineering packages from Upfront Engineering consisting of design drawings, bill of materials & specifications. Contractor will develop a fixed Maximum Price for the Balance of the Work using the Open to Closed Book Approach. Owner would have full review and participation as the firm price is developed including the following:

    - **Engineering:** Contractor to complete the remaining engineering as identified within the scope of work. Price for this work would be based upon mutually agreed hours, rates and expenses.
    - **Procurement & Equipment Purchase**: Contractor to select equipment and costs from Owner approved suppliers on a competitive bid basis managed by Contractor. Owner would pay Contractor for the actual equipment costs plus an agreed Contractor's Fee. The price would also include Contractor's hours to purchase and manage the suppliers and equipment using the agreed upon rates.
    - **Construction & Subcontractors:** Contractor to select subcontractor services and costs from 2-3 approved Owner approved subcontractors on a competitive bid basis managed by Contractor. Owner would pay Contractor for the actual costs plus an agreed management fee percentage. Services would also include Contractor hours to manage & execute the construction using the agreed upon hours and rates
    - **Miscellaneous Costs:** This includes project related costs, such as insurance, taxes, testing equipment, permit applications, travel and other general costs. These costs would be a direct pass thru from Contractor to Owner and would not include a mark-up or management fee.

Once the firm scope and price is agreed upon between Owner and Contractor, the books would be closed and Contractor would deliver the Balance of the Work for a firm price.

The Open to Close Book process provides the necessary level of collaboration allowing changes in scope to be to evaluated prior to beginning the implementation phase of the Balance of the Work

After submission of the Balance of the Work , Contractor and Owner will meet to discuss and review the Work. If Owner has any comments regarding the Work and Price, or finds any inconsistencies or inaccuracies in the information presented, there will be an opportunity for the Contractor to address.

If Owner accepts the Balance of the Work, its basis shall be set forth in a Notice to Proceed for the Balance of the Work per the Contract .

Appendix AA3-7: EPC Appendix C – Owner's Policies

APPENDIX C – OWNER'S POLICIES

This Appendix will be completed by the parties during the *Upfront Engineering Services* and included in the *Notice to Proceed with Balance of Work*.

Appendix AA3-7: EPC Appendix D – Warranty Items Procedure

APPENDIX D – WARRANTY ITEMS PROCEDURES

This Appendix will be completed by the parties during the *Upfront Engineering Services* and included in the *Notice to Proceed with Balance of Work*.

APPENDIX E – FORM OF PARENT GUARANTY
(FILED IN CONFIDENCE)

Appendix AA3-7: EPC Appendix F – Forms

APPENDIX F – FORMS

This appendix consists of the following Schedules.

- Schedule 1 – Key Personnel Confidentiality, Proprietary Information and Consent Agreement

- Schedule 2 – Statutory Declaration (CCDC Form 9A)

Additional Schedules will be agreed to by the parties during the *Upfront Engineering Services* and included in the *Notice to Proceed with Balance of Work*:

SCHEDULE 1 – KEY PERSONNEL CONFIDENTIALITY,

PROPRIETARY INFORMATION AND CONSENT AGREEMENT

Dated effective _____, 20__

TO: _____
(the "Contractor")

AND TO: _____
(the "Owner")

I, _____ (the "Employee"), in consideration of the Owner consenting to my participation in the performance of certain work (the "Work") by the Contractor for the Owner pursuant to an agreement (the "Agreement") made between the Owner and the Contractor dated as of _____, 20___ with respect to _____ [Project]; and for the further consideration of $1.00, from each of the Contractor and the Owner, the receipt and the sufficiency of which are hereby acknowledged, do hereby agree, separate and apart from the Contractor, as follows:

1. I have had my role and responsibilities explained to me by the Contractor, or I have reviewed a copy of the Agreement and agree to observe the terms and conditions that relate to employees and subcontractors of the Contractor.

2. I shall perform for the Contractor such duties as may be assigned to me by the Contractor from time to time pertaining to the Work. I agree that all inventions, copyright, copyrightable works, discoveries, improvements, industrial designs and other intellectual and proprietary rights conceived, originated or prepared by me, arising directly or indirectly from the performance of the Work, are and shall be the exclusive property of the Owner or the Contractor as determined in accordance with the terms of the Agreement.

3. I shall not, without the prior written consent of the Contractor and the Owner, either during or for a 5 year period after my employment by the Contractor, use or disclose any information acquired by me in the course of or by reason of my participation in the performance of the Work, nor will I disclose to any person not in the employ of the Contractor any such information, including, without limitation, any information as to technology, policies, operations, processes or formulae used, owned or supervised by the Owner or by any of its affiliates. At the termination of the Agreement or earlier if so requested, I shall forthwith return to the Owner all confidential information in my possession.

I agree that, if any provision in this undertaking is found to be invalid or otherwise unenforceable at law, such provision shall be severed, and the remaining provisions shall continue in full force and effect.

Witness	Employee

SCHEDULE 2 – STATUTORY DECLARATION (CCDC FORM 9A)

See attached.

Appendix AA3-7: EPC Appendix G – Dispute Resolution Procedure

APPENDIX G - DISPUTE RESOLUTION PROCEDURE

1. In the event of disagreement between the parties as to the performance of the *Work* or the interpretation, application or administration of the *Contract*, the *Contractor* shall perform the *Work* as directed by the *Owner's Representative*. All differences between the parties not resolved by the decision of the *Owner's Representative* and all disputes and claims of either party arising out of the *Contract* and its performance shall be settled in accordance with this Appendix G – Dispute Resolution Procedure.

2. The parties shall make all reasonable efforts to resolve all disputes and claims by negotiation and agree to provide, without prejudice, open and timely disclosure of relevant facts, information and documents to facilitate these negotiations.

3. Either party shall be entitled by notice to the other party to call for the appointment of an individual to act as a Project Mediator (the "Project Mediator"), in which case the parties shall within 10 *Work Days* jointly nominate a Project Mediator. If the parties do not agree on the appointment of a Project Mediator, then either party may request the ADR Institute of Canada, Inc. to appoint a Project Mediator, who when so appointed shall be deemed acceptable to the parties and to have been appointed by them.

4. The parties shall submit in writing their dispute to the Project Mediator, and afford to the Project Mediator access to all records, documents and information the Project Mediator may request. The parties shall meet with the Project Mediator at such reasonable times as may be required and shall, through the intervention of the Project Mediator, negotiate in good faith to resolve their dispute. All proceedings involving a Project Mediator are agreed to be without prejudice, and the cost of the Project Mediator shall be shared equally between the parties.

5. If the dispute has not been resolved within 21 days after the appointment of the Project Mediator either party may by notice to the other withdraw from the mediation process.

6. All disputes, claims and differences not settled as provided for in this Appendix G – Dispute Resolution Procedure, arising out of or in connection with the *Contract* or in respect of any defined legal relationship associated with it or derived from it, shall be referred to and finally resolved by arbitration in accordance with the Ontario Arbitration Act. The arbitral tribunal shall be composed of one arbitrator where the subject of the dispute, claim or difference relates primarily to whether work required to be performed is within the scope of the *Work* or the *Contractor* has met the required specifications of the *Contract*, and the *Work* has not yet been completed when the matter is referred to arbitration. In all other cases the arbitral tribunal shall be composed of one arbitrator, one appointed by each party who shall select the third who shall act as chair. The location of the arbitration shall be Sault Ste. Marie, Ontario, or such other location as the parties may agree.

Appendix AA3-7: EPC Appendix H – Key Personnel

APPENDIX H – KEY PERSONNEL

The following individuals are *Key Personnel* for the *Upfront Engineering Services*:

[redacted]

During the *Upfront Engineering Services*, the parties will agree to the *Key Personnel* for the *Balance of Work*, who will be included in the *Notice to Proceed with Balance of Work*.