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## 1. Scope of the document

The present document is to scope the minimum requirements for Consultant Services for Commissioning which are to ensure, demonstrate and document that the upgraded and expanded SEWPCC meets:

- The requirements of the Environmental License
- The City's functional requirements (safety, quality assurance, constructability, performance, operability and maintainability...)
- The design performance requirements
- The O&M personnel training, staffing and organizational requirements
- Acceptance and Turnover requirements

## 2. Purpose

The Consultant Services Project Commissioning Requirements is structured to initiate a master planning tool relating to commissioning, setting out scope, standards, roles and responsibilities, expectations, and the type of commissioning deliverables to be produced. It provides an overview of commissioning, general requirements and a general description of typical elements that make up the Project Commissioning Plan (PCP). It sets out the framework and the methodology for the successful commissioning of the SEWPCC Upgrading/Expansion Project.

The Consultant Services Project Commissioning Requirements does not contain details of the requisite testing procedures, to be developed, by the Consultant for Commissioning. Rather it states the scope and the responsibilities for the development of these procedures.

In order to update and complete the present document, the Consultant shall be responsible for the preparation and development of the Project Commissioning Plans that will be submitted to the City for approval.

### 3. Definitions and Acronyms

<b>Definitions</b>	
Acceptance Criteria	Defined Limits: i.e. specified indicators and limits, placed on characteristics of materials , products and services, established by the consultant of supplier, to ensure conformance to the product design
Commissioning	Process by which equipment , a facility or a plant which has been verified as successfully constructed and installed , is tested to verify if it functions according to design and functional requirements
Project Commissioning Plan	A Project Commissioning Plan created by the Consultant detailing the commissioning processes, roles and responsibilities, commissioning specifications and objectives, procedures, verification and certification requirements and documentation and acceptance criteria relative to the specific project .
Program Team	Combination of City of Winnipeg and Veolia Water management personnel formed to direct the development of the WSTPPCC upgrades and expansion Program which includes SEWPCC Upgrading/Expansion Project.
Commissioning Team	The Commissioning Team comprises project stakeholders’ members, is led by the Consultant and is assembled to facilitate the commissioning development and delivery.
DMS	DMS is an in-house application developed to be the departments Document Management, Control and Records Archiving System. DMS facilitates all document related processes and supports CMMS for plant operation and Maintenance.
<b>Acronyms</b>	
AC	Acceptance Certificate
CCA	Commissioning Completion Assurance
CCP	Commissioning Control Point
CP	Commissioning Procedures
CMMS	Computerized Maintenance Management Software
CRP	Commissioning Reports
CSO	Commissioning Specifications and Objectives
EA	Environmental Assessment
FAT	Factory Acceptance Test
ICL	Installation Check List
O&M	Operations and Maintenance
OSHP	Occupational Safety and Health Plan
PCP	Project Commissioning Plan
PT	WSTP Program Team
PV	Performance Verification
QA	Quality Assurance
SEWPCC	South End Waste Pollution Control Centre
SOP	Standard Operating Procedure
WSTP	Winnipeg Sewage Treatment Program

## 4. Commissioning Process

The Commissioning of the SEWPCC Upgrading/Expansion will be accomplished under the responsibility of the Consultant through a systematic quality assurance process designed to ensure that the plant will perform according to the design requirements and City's operational needs.

Various resources are engaged in this commissioning process within the different phases of the project. These resources operate either on site or in the office, and are involved in design, construction or administration tasks. The commissioning process overlaps the project delivery phases, and is itself staged in its own Project Commissioning Phases.

The occurrence of the commissioning phases of different units may be staged.

### 4.1. Commissioning Phases

#### 4.1.1. Phase 1- Project Commissioning Planning

Project commissioning aspects are to be taken into consideration during project conceptual design development in the designer definition of the upgrading/expansion project and in the development of a conceptual level project implementation plan and further in the development of preliminary and detailed levels of the project implementation plan.

During the Preliminary Design phase of the project, the Consultant shall prepare a strategy as to how the plant processes can be commissioned and brought on line in a staged manner relative to overall plant construction and ongoing operations.

- (i) The Consultant shall develop a Preliminary Project Commissioning Plan (PCP):
- (ii) The plan shall provide the concept and preliminary details as to how the project components can be brought on-line relative to the overall plant construction and ongoing operations.
- (iii) The plan shall address all key project components.
- (iv) The plan shall minimize impact to the facility's capability to meet its regulatory obligations and provide detail of any planned impacts.
- (v) The plan shall encompass the various aspects of commissioning including training, inspection, quality, start-up, testing, verification and handover to operations. The plan shall identify roles and responsibilities, procedures and processes, quantified anticipated resources, equipment, utilities and consumables, including start-up chemicals.
- (vi) The level of detail shall be such as to enable the needed level of costing of the commissioning efforts. (+/-20%)
- (vii) As minimum, the plan shall be in conformance with the requirements of the present document.

The Preliminary Project Commissioning Plan will be further developed to more detailed levels in Detailed Design and Construction Phases.

The level of details required for Detailed Design Phase is to be used for a cost estimate to an accuracy level of +/-10%. All commissioning activities have to be defined at this stage.

Based on the commissioning strategy the Consultant shall develop a Commissioning Delivery Schedule to be integrated within the various issues of the Project Master Schedule

The Project Commissioning Plan shall develop and complete the present document while conforming to its minimum requirements in order to perform all the intended functions. It will be a planning document providing adequate instruction, management and control tools to ensure commissioning activities are carried out correctly, in compliance with the design intent, regulatory and quality requirements. Moreover, it will identify and define the Commissioning Specifications and Objectives, procedures, prerequisites, resources and activities associated with the performance of equipment and systems.

It shall address the methodology and the following aspects set out in the present document

- Management of Commissioning activities (including safety concerns and risk management)
- Commissioning Organization
- Commissioning Phases
- Commissioning control points
- Commissioning Schedule
- Commissioning Responsibilities
- Commissioning Specifications and Objectives
- Stakeholder Interfaces
- Commissioning Budget
- Commissioning Documentation
- Commissioning Deliverables
- Training requirements and schedule
- Facility Turnover to City of Winnipeg Operations
- Commissioning Completion Assurance checklist

The Project Commissioning Plan (PCP) will describe these tools as well as the procedures, to manage the interfaces between the respective teams with detail of controls to be implemented for the performance of the commissioning tests. Examples of details to address in the management and control arrangements are as follows:

- Work Planning and Control
- Procurement of Commissioning Materials and Services
- Commissioning Control Points (CCP) from phases 1 to 5
- Transfer of operational responsibility and of Ownership of Equipment
- Control of Non-Conformances and remedial measures taken

- Change Control
- Commissioning of temporary works
- Environmental Protection
- Occupational Health and Safety
- Good Housekeeping and Cleanliness
- Commissioning Completion Assurance
- Acceptance and Turnover

The Project Commissioning Plan (PCP) also functions as a communication tool, addressed to the Program Team, Consultant, Construction Contractors, Plant Operations and other stakeholders informing each of them in general terms, of their roles and responsibilities.

In particular, for commissioning related activities and control of documentation, the PCP shall detail clearly the limits of responsibilities among commissioning, design, construction, contract administration and operations functions. It shall formalize the transfer of responsibilities among these groups.

The PCP shall be project specific, incorporating all constraints relative to the upgrading/expansion of the existing plant while maintaining its production, in particular but not limited to, staged start-up of various process units or areas, decommissioning of redundant equipment and implementation of the switch over from DCS to PLC control systems in all existing plant areas.

Phase 1 Planning includes all activities and the production of deliverables that are required ahead of site commissioning and of other project development phases.

In particular, the consultant shall develop and prepare all commissioning specifications and objectives, specific tools, instruments or equipment required for commissioning tests, and O&M personnel training requirements relative to equipment acquisition, for inclusion into procurement documents.

The PCP will be supplemented with commissioning procedures prepared by the Consultant based on Consultant know how and suppliers documentation to describe the details of the tasks. Procedures will be used to inspect, test and verify the installation and operation of the treatment process from individual functions such as equipment components, interconnections, controls systems, process areas and ultimately to the integrated process as a whole.

All these deliverables are to be developed as required to implement the project. The level of detail and staging over the different commissioning phases shall be identified in the PCP.

#### **4.1.2. Phase 2 Pre-Commissioning**

Pre-Commissioning activities will include the verification of FAT, inspection, testing, performance verification records from previous quality assurance testing certifying the equipment incorporated into the project.



The Consultant shall specify commissioning requirements and participate in the platform tests for automation and control system and, as required, complex proprietary systems or safety and critical equipment.

Pre-commissioning site activities will formally start with the inspection by the consultant of all components installed by the contractor prior to any commissioning tests being performed. This inspection shall coincide with the “end of construction” inspection carried out by Contract Manager, administrator and contractors/vendors. This inspection can correspond to the satisfactory installation or the substantial performance of the equipment depending on the complexity of the contracts. The Documentation evidencing these inspections will be included and incorporated in the City DMS.

Following operations are normally carried out prior to or during the inspection visit.

- Instruments calibration
- Hydro and pressure tests
- continuity tests
- check of operation and setting of safety valves...
- mechanical aligning and rotation check
- nondestructive tests
- Cleaning, rinsing, flushing...

When inspection visits have been completed for significant system packages that can be isolated from other construction works and are easily manageable in terms of process, the system packages will be transferred from Construction to Commissioning Phase with the formal transfer of technical leadership.

Pre-commissioning Phase will encompass the dry startup and operational testing of all equipment and control systems by the contractors and suppliers. It includes all preparation works of systems that may have not been carried out previously in individual contractors or suppliers’ packages. It consists in checking that equipment will have the capacity of performing according to Commissioning Specifications and Objectives (CSO) expectations in testing conditions with no process fluid or with substituted fluids and in isolation to the effective functioning of surrounding other equipment. These tests may be part of specific vendors/contractors scope to demonstrate performance of their deliveries, however, during this phase, the validation of testing procedure and coordination of testing activities that will involve other disciplines and staff are under the Commissioning Leader. The input and the staff required for performing the test are preferably from the contractor supplying/installing the equipment. The tests performed may verify conformance of the deliveries from one or several contractors/suppliers. The involvement of other Commissioning Team members will depend on the complexity of the equipment or system and its utilities/resources requirements for conducting the test.

Formal handover of asset information and commissioning related documents including first issues of Operating and Maintenance Manuals to Commissioning Team will occur during this phase.

### **4.1.3. Phase 3- Commissioning of Component Process Systems**

During this phase, all concerned equipment (including control systems) have either been verified, cleaned and dry tested or certified as not requiring such dry test.

This phase of commissioning will be performed by the Commissioning Team under the direction of the Commissioning Team Leader with contractors and operations resources and provides hands on training to plant operators.

It will encompass the wet startup and operational testing of all process equipment and control systems included in one or several zones or process units. It will focus on the equipment and system functionality to assure that all design, specification and system requirements have been verified and meet design requirements. Documentation evidencing the testing shall be issued into the DMS.

In addition to site training, classroom and shop training for plant operators and maintenance personnel will also be conducted during this phase.

The functioning of the automation and control system should be completed at the end of this phase, including switch over of all existing units to the PLC system.

The preparation of Operation and Maintenance or areas manuals and Standard Operating Procedures will be nearing completion by the Consultant dedicated resources during this phase and will involve knowledge acquired by the Commissioning Team, and a draft issue shall be issued prior to entering Phase 4.

### **4.1.4. Phase 4- Aggregate Process Commissioning**

This phase will focus on process commissioning of the complete project with the SEWPCC influent.

Commissioning activities programming, control and execution will be undertaken by the Commissioning Team Leader with resources from operations and selected contractors as well as the other Commissioning Team participants.

The Process commissioning will include but is not be limited to:

- Progressive start-up of units
- Verification of effluent objectives in relation to available influent and plant functioning and performance being continuously met over a prescribed time frame of 30 days,

The acceptance criterion will correspond to a fully commissioned plant capable of performing according to requirements and ready for being run by fully prepared operations staff.

The Operation and Maintenance Manuals, Areas Manuals, Standard Operating Procedures should be completed and delivered within one month of end of Phase 4.

At the end of Phase 4, the responsibility of running the plant will be transferred to Operations.

#### **4.1.5. Phase 5-Commissioning Validation**

This phase will be conducted as soon as plant influent and weather conditions allow for testing of the Plant performances under all design conditions.

The objectives are:

- Verification of performance utilizing influent under varying plant loads and seasonal conditions
- Plant Acceptance (with all associated activities and deliveries)

The details and program of this phase are to be prepared by the Consultant and the plant will be run under Operations responsibility by Operations personnel. The time frames proposed for the tests will be suited to the processes reaction times.

The consultant will witness, analyze and adjust the program during the tests period, and compile and provide all reports and documentation.

In case the verification of the performances of the plant cannot be demonstrated during the tests, due to design, commissioning or other reasons under Consultants responsibility, additional complete or partial tests shall be conducted after adaptation of the plant processes.

In case, due to wastewater and weather conditions not being close enough to the design requirements and the impossibility of physically simulating these conditions, the verification of the performances of the plant cannot be achieved within 12 months after the acceptance of Commissioning Phase 4, the Phase 5 tests shall be performed as close to design conditions as possible and the City and the Consultant shall meet and agree on adjusted acceptance criteria.

These criteria will be based on the results of computerized simulations by the BIOWIN model developed by the Consultant for the Project and approved by the City. Parameters and other settings in the software will be adjusted to actual processes reactions observed during all Commissioning phases.

### **4.2. Control of Commissioning**

The commissioning control methodology, plan, procedures and tools will be developed by the consultant as part of his PCP scope described in the first commissioning phase to be implemented during the whole commissioning process. Formal Commissioning Control Points (CCP) are to be employed to control commissioning activities. The objective of the formal control points is to ensure that the objectives, documentation and responsibilities of each phase have been achieved before proceeding to the next commissioning phase and ultimately to the acceptance and turnover to plant Operations.

As a minimum, formal Control Points will be established as follows:

**Control Point 1-** Completion and Project Manager acceptance of the initial version of the Project Commissioning Plan

**Control Point 2-** End of Phase 2 Pre-Commissioning- all documentation and equipment checks complete

**Control Point 3-** End of Phase 3 Component Process System startup and equipment performance verification, run tests and associated certification documentation

**Control Point 4-** End of Aggregate Process Commissioning. Plant ready for phase 4 acceptance complete with all documentation and for turnover to Plant Operations

**Control Point 5-**End of Phase 5 Final Acceptance by Project manager

## **5. Roles and Responsibilities**

This section defines the roles and responsibilities of the principal stakeholders to the commissioning process. Members of the principal stakeholders will be included in and form a Commissioning Team that the Consultant shall identify in the Project Commissioning Plan.

The involvement of various members of the Commissioning Team shall be staged over the entire commissioning process and will conclude upon acceptance of the facility by the City Project Manager at the end of Phase 5

The composition and functioning of the Commissioning Team will be developed by the consultant and defined in the PCP in accordance with but not limited to the requirements of the present document. The Consultant shall lead the Commissioning Team.

### **5.1. Consultant Commissioning Scope and Organization**

The Consultant has the responsibility and shall ensure that all commissioning activities are carried out according to the minimum requirements of the present document, culminating in the delivery of a fully operational plant compliant and complete in every respect.

The Consultant has the responsibility to deliver the Project Commissioning Plan, and subsequently to develop it. The Consultant is responsible for ensuring that the design requirements and objectives are properly translated into commissioning specifications and objectives, for issue of procedures and for site activities, and for ensuring that commissioning records demonstrate compliance with the requirements.

In a general sense, the consultant shall prepare, put in action and control the whole commissioning process. All commissioning related items described in the present document are included in the Consultant scope unless otherwise specified.

Key responsibilities include:

- Provide and engage a Commissioning Team Leader
- Provide all qualified resources and organization to perform commissioning related activities pertaining to the Consultant scope,
- Prepare the PCP based on the requirements of the present document.
- Implementation of project commissioning activities as early as preliminary design phase, which include:
  - Development of tools and procedures
  - Commissioning Quality management
  - Commissioning Risk Management
  - Establish Commissioning Specifications and Objectives
  - Defining the commissioning and monitoring activities
- Develop roles and responsibilities, procedures and processes, quantified anticipated resources, equipment, utilities and consumables, including start-up chemicals.
- Augment the PCP c/w plan performance and measurement criterion
- Maintain commissioning elements of cost control, forecasting and reporting against budget during all commissioning phases
- Development of a Commissioning Schedule for integration within the Project Schedule
- Ensure integration of commissioning requirements into construction contract documents
- Issuing, developing and recommending for approval of all commissioning documentation
- Performing verification of performance on installed systems
- Acceptance of areas for transition from construction to commissioning
- Preparation of training plans and monitoring of training activities
- Provision of training sessions on Project processes or other required topics
- Coordinating and ensuring acceptable and uniform standard of video records of each unique training session is provided to the City.
- Monitoring commissioning activities, witnessing and certifying the accuracy of the reported results
- Ensuring all Commissioning Team members have clear definition of their role and understanding of their responsibilities
- Tasking, coordinating and ensuring leadership of the Commissioning Team and other resources during realization of commissioning activities at office and at site while monitoring and reviewing their effectiveness,
- Commissioning of all Project's scope (including integration of existing units, required decommissioning, and switching over from DCS to PLC control systems in all existing parts of the plant),
- Taking into consideration safety health and environmental aspects particularly during site commissioning activities and implement measures as required through established site safety management procedures
- Reviewing commissioning documentation for performance, reliability, durability of operation, accessibility, maintainability and operation efficiency under all conditions of operation
- Prepare agenda, lead and record minutes of the Commissioning Team meetings

- Management of commissioning documentation up to Plant Acceptance.

Some of the boundaries regarding the Consultant responsibilities are stated here after:

At site, while the Construction Manager scope covers all site activities, the Commissioning Team Leader is delegated technical responsibility and is in charge of all site commissioning activities.

The Consultant shall be responsible for the lead and organization of the commissioning activities from commissioning phase 1 thru 5, with effective direct management of the Commissioning Team members activities until end of phase 4. The operational responsibility shall be transferred from the Commissioning Team to Plant Operations at the end of Phase 4 Aggregate Process Commissioning.

During the commissioning phases, all activities regarding the discharge of water in the plant outlet will be undertaken in consultation with the City and in consideration of the regulations.

For preparation of plans and commissioning documentation, the use by the consultant of input from other Commissioning Team members as appropriate, will not relieve him from his overall responsibility over the commissioning process.

## **5.2. Project Manager (City of Winnipeg)**

The Project Manager liaises with the Program Team, keeping them abreast of commissioning progress, risks, quality, budget and schedule as well as acceptance of commissioning generated documentation. Responsibilities in regard to Commissioning include:

- Review and acceptance of the PCP and other Commissioning related documentation
- Procurement of commissioning related required items
- Acceptance of Project Commissioning, Plan, Training Plans, documentation ...
- Participates in Commissioning Completion Assurance (CCA) meetings
- Accepting CCA documentation
- Delegation of day to day responsibilities to Program Team Commissioning representative
- Management of high level conflicts and participation in major commissioning meetings

## **5.3. Program Team Commissioning Representative**

The Program Team Commissioning Representative is the link between the city and the consultant during commissioning and is delegated duties by the Project Manager on day to day commissioning activities.

He is therefore part of the City control process as well as a member of the Commissioning Team.

Key responsibilities include:

- Controls Commissioning Team outputs and has access to all commissioning documents
- Monitors commissioning activities, training and development of the commissioning documentation.
- Reviews technical components of all commissioning documentation recommended by the Consultant for further action by the City
- Is an active Commissioning Team Member:
  - Participates and provides input to the definition and planning of the commissioning requirements
  - Makes his expertise available to the Team
  - Liaise with PM for day to day activities, participates in meetings
  - Witnesses and certify recorded results of commissioning tests
  - Attend and participate in relevant Commissioning Team meetings

## **5.4. Construction Manager**

The Construction Manager or optional Contract Administrator is responsible for the following:

- In charge of coordination of all site construction and commissioning activities, while delegating management of the commissioning effort to the Commissioning Team Leader
- Verifying contractors/vendors provide commissioning requirements (documents, manpower, ancillary provisions...)as stipulated in their contract documents
- Keep Commissioning Team informed on construction progress with respect to scheduling
- Management and arrangement of substantial performance or total performance inspections for readiness for pre-commissioning
- Issuance of Total Performance Certificates, as recommended by the Commissioning Team Leader, for construction and supply contracts
- Administer any contractual changes in scope to facilitate commissioning
- Incorporate commissioning costs into project cost control system c/w forecasting final commissioning costs
- Direct contractors to make remedial measures for construction deficiencies
- Verify contractor submittals are appropriately reviewed, accepted and incorporated into the DMS
- Responsible for overall construction and commissioning Site Safety , Health and environment aspects,  
Attend and participate in relevant commissioning team meetings

## **5.5. Contractor/Major Vendors Organization**

The Consultant shall define construction contractor or contractors' responsibilities which may include:

- Quality Control of their scope

- Provision of O&M documentation of contractor supplied equipment
- Submitting contractor supplied vendor equipment startup and testing procedures with safety information
- Preparing system/equipment specific installation checklists (ICL)
- Submit completed Installation Checklists and Performance Verification forms
- Performing contracts startup and performance verification activities with input/participation of major equipment vendors within Commissioning Team activities
- Submission of field and classroom lessons, plans and training instructors
- Provision of training on contractor supplied equipment and systems for commissioning and for operations and maintenance
- Provide skilled craft labor and supervision to undertake commissioning activities during and beyond supplied equipment contractual total performance as per procedures and under Consultants leadership
- Attend and participate in relevant Commissioning Team meetings

## 5.6. Operations Representative

The Operations representative is an integral component of the Commissioning Team and will be responsible for:

- Managing the O&M activities within the interface between the Commissioning Team and Plant Operations according to Project Commissioning Plan and procedure
- Being instrumental in the definition of O&M personnel training requirements
- Provision of operations crew(s) as resources for the Commissioning Team
- Coordinate O&M personnel attendance for training sessions
- Review planned commissioning activities with respect to SEWPCC operating requirements
- Authorize applicable work permits as required
- Validate daily commissioning activities in regards to aggregate plant output
- Providing operations input into the commission process as a whole including HAZOP, Safety procedures...
- Take charge of plant operations at end of Phase 4
- Providing all management and operations personnel for running performance tests under varying loads and seasonal conditions during phase 5
- Attend and participate in relevant Commissioning Team meetings

## 6. Training

The Consultant shall be responsible for overall training and shall identify and provide for the Operation, Maintenance and Commissioning training needs within the PCP. The Consultant shall Identify available



skills and establish the objectives to be performed by the training for each category of personnel in regard of overall training objectives and in particular:

- Inclusion of proctored tests for operators CEU's,(Continuing Education Units) when achievable;
- ensure the qualifications of the personnel for performing commissioning activities,
- ensure proper operation of the plant after turn over
- ensure proper maintenance of the plant during plant live cycle
- Optimize the training in regard to a proposed Operations and Maintenance organization
- Identification of training roles and responsibilities.

The Consultant shall develop the training plan with input from the Contractors, equipment vendors and the City. At Preliminary design phase the Consultant shall define the minimum requirements that vendors will need to supply in terms of training.

The detailed training plans shall be submitted to the Project Manager for review and acceptance. During preparation of the plan and training sessions, the Consultant shall close all gaps revealed by the consolidation of the input from others by providing with his resources the training material and sessions in order to insure completeness of the training.

At the end of training, the consultant shall compile all the training materials to form a complete training document including review and participation in editing and finalizing the videos of each training session that is recorded.

The training defined in the training plans must be sufficient to provide City of Winnipeg Operations and Maintenance personnel with the necessary skill and knowledge to operate and maintain the SEWPCC Upgrading/Expansion. Meeting O&M training objectives is a condition for acceptance of Commissioning Phase 4.

All training sessions will be replicated to facilitate manpower scheduling in concert with continual plant operations manpower requirements. In other words two or more teams of Operations and Maintenance personnel shall receive training independent of each other.

The contractors will be responsible for providing qualified training instructors, field and classroom lesson plans for the scopes associated with their contracts and as per tender requirements.

Facilities for providing local classroom training will be arranged by the City.

## **7. Commissioning Documentation**

The following documents are related to Commissioning and have to be produced, recorded, signed, compiled and approved.

## **7.1. Project Commissioning Plan (PCP)**

The Project Commissioning Plan (PCP) is a fundamental commissioning document as detailed in relevant 1<sup>st</sup> Commissioning Phase chapter. The preliminary issue delivered by the Consultant during Preliminary Design Phase is completed and updated during the whole Commissioning Process.

## **7.2. Commissioning Specification and Objectives (CSO)**

The Consultants Commissioning Specifications and Objectives (CSO) documentation shall describe the commissioning tests required to demonstrate the design intent of the SEWPCC Upgrading/Expansion Project. The Consultant will translate the design requirements and objectives into Commissioning Specifications and Objectives.

CSO are the primary documents used to identify the suitable commissioning testing requirements. The CSO documents are derived from the design requirements documentation. The core purpose of these documents is to provide an auditable link between the design requirements and the objectives and acceptance criteria stated in the Commissioning Specification and Objectives documentation.

The CSO documents are used to construct the Commissioning Procedures, with the approved acceptance criteria and applicable tolerances tabulated, in the detailed commissioning test.

## **7.3. Commissioning Procedures (CP)**

The procedures provide the detailed information to support the completion of the specific field activities necessary to complete field testing and ensure that the CSO for the SEWPCC Upgrading/Expansion Project are met.

Commissioning Procedures will be developed by the Consultant for each SEWPCC Upgrading/Expansion system requiring commissioning based on the vendor's documents and/or the Consultant's know how. The procedures will be reviewed by the Commissioning Team and finalized by the Leader for acceptance. Each procedure will be specific to the respective system, process unit or facility to which it pertains. The general content of the respective procedures will include:

- Acceptance Criteria
- Prerequisite testing
- Pre-Commissioning documentation required
- Agreed outstanding deficiencies that will still permit commissioning
- Performance Verification testing
- Back out provisions
- Control Points
- Visual monitoring requirements by Commissioning Team members

- Independent verification of commissioning activities
- Resources (Consumables, equipment, chemicals, utilities, labor...)
- Definition of Boundaries
- Hazard and safety
- Specific instrumentation
- Sign-offs required

## **7.4. Operation & Maintenance Manuals, Area Manuals, Standard Operating Procedures**

These documents are part of the commissioning process deliverables; however, for this project they have been included in a specific package as per RFP (See RFP sections D5.7.1 & D5.7.2 for Area Manuals and SOPs and section D.5.6.4.h.ii for Operation and Maintenance manuals).

The Consultant may use resources and knowledge acquired from his personnel, member of the Commissioning Team as required, however, this documentation lot is to be managed specifically. Similarly to ‘as built drawings’, it is part of the turn over documents that are primarily managed within other Consultant assignments.

## **7.5. Commissioning Reports (CRP)**

Commissioning reports are required to provide summaries of settings, tests, objectives, and evidence of test results in a concise format to demonstrate successful completion of the commissioning tests comprising each phase of the commissioning process. The reports are to be prepared and certified by the Consultant. These reports confirm that the results are acceptable from the safety and technical viewpoints, and demonstrate that the equipment, systems, units and facility, meets the designed intent. The reports describe how the commissioning philosophy which was established has actually been put into practice. The commissioning report structure should be clearly defined in the Project Commissioning Plan. The respective reports support the transition from one commissioning phase to another. The Commissioning Reports are a component of Commissioning Completion Assurance.

Commissioning Reports have the following function to perform; these include but are not limited to the following:

- Summarize the results from the PCP for the facility systems in general, the equipment and processes, and compare them with the CSO requirements for all installed systems and equipment , which may include:
  - Identification of any modifications to the facility or equipment that have safety implications that have arisen from the commissioning process
  - Identification of any problems or issues that arose during commissioning and how they were resolved (lessons learned)

- Identification of outstanding issues requiring further consultation and resolution
- Confirm the appropriate phase of commissioning has been completed and that it is safe to proceed to the next phase
- The details of preparing for and execution of each commissioning phase
- The control measures employed during commissioning, e.g. work planning, control points, and phase completion certification and transfer of responsibility
- The CRP is a permanent record and shall be included in the Commissioning History File.

Whenever necessary, Interim Commissioning Reports may be produced temporarily and be completed or replaced by Final Commissioning Report:

- **Interim Commissioning Reports**

Interim Commissioning Reports may be produced under the following circumstances:

- Were the completion of certain tests has been deferred, and were not all testing needs to be completed to permit proceeding to the next phase of commissioning. When outstanding testing has been completed, the Interim report should be updated and the Final Commissioning Report issued
- Interim Commissioning reports can be prepared to document the process on a particular system or unit, or for quick assessment of the test results before the Commissioning Control Point is reached. In this instance the complete CRP for the particular system or unit will include both an interim and final commissioning report.
- Interim Commissioning reports shall be prepared to facilitate sequencing of continual plant operations during integration of the new works with the existing facility.

- **Final Commissioning Report**

The Final Commissioning Report provides a complete review of all commissioning by phase. It describes how the commissioning philosophy which was established has actually been put into practice. It gives information on the storage and availability of all the detailed commissioning results which include but is not limited to:

- Conventional safety systems
- Equipment Testing
- Building Services
- Lessons learned

The final report also summarizes all significant changes made to the equipment, systems or process as a result of the commissioning.

## **7.6. Other Commissioning documents**

The Consultant shall propose during PCP development a list of other Commissioning Documents, including documents relating to OSHP, EA, communications, management, controls, lists, programs....Corresponding proposed filing and recording methods shall be compatible with DMS principles.

In general, Turn Over documents will be updated by the Consultant to reflect any changes that have occurred during Commissioning Phases to constitute the final version.

## **7.7. Commissioning Completion Assurance (CCA) and Commissioning History Files**

Commissioning Completion Assurance (CCA) is conducted to provide objective evidence that the commissioning has been accomplished. The CCA provides confidence that all commissioning activities are complete. CCA documentation includes the planned measures to resolve all outstanding items and deficiencies.

Commissioning Completion Assurance shall be accomplished by the following means:

- Completion of all commissioning activities and reports
- Meetings held, as required by the respective commissioning phases
- A CCA document has been completed by the Consultant and ready for sign-off by the Project Manager and other stakeholders.

Following sign-off of the CCA, commissioning records shall be compiled into a Commissioning History file and included in the CCA documentation. Each commissioned system shall have a distinct Commissioning History sub-file and submitted in electronic format and hard copies. Electronic copies will be stored in the DMS for the life of the facility.

## **7.8. Commissioning Records**

The Commissioning Team Leader must ensure full and accurate sign off records are kept of the tests carried out during commissioning. The Commissioning Team shall complete the requisite commissioning quality records and confirm completeness utilizing a comprehensive Commissioning Completion Assurance (CCA) checklist, previously issued by the consultant and approved by the Project Manager.

The following records, as a minimum, shall be uploaded to the DMS in addition to required hard copy records:

- Commissioning reports including settings
- Commissioning plans and procedures

- Evidence of commissioning verification
- Deficiency reports and corrective actions taken
- Training reports
- Other commissioning documents

Final compilation is organized according to Commissioning Completion Assurance (CCA) and Commissioning history files.

The Consultant shall include all Commissioning Records in the projects' turnover document package within one month of achieving Commissioning Control Point 4.

Complements and updates will be introduced after performing the Phase 5 tests.

## **8. Communications**

The Commissioning Team Leader shall call meetings as and when necessary. Attendance should be limited to expedite progress and effectively resolve problems related to the commissioning activities. As a general rule Commissioning Team meeting shall be held at prescribed regular frequency for each phase to engage the team and openly discuss any issues that have impacted the efficiency and progress of the commissioning schedule.

The primary objective of these meetings shall include:

- Plan the commissioning activities
- Review of priorities and overall progress
- Testing and commissioning activities
- Testing and commissioning dependencies and conflicts
- System Interfaces
- Commissioning schedule
- Resources and actions
- Hazard review
- Commissioning optimization

## **9. Regulatory Framework**

The SEWPCC upgrade and expansions are principally driven by regulator defined effluent compliance requirements. The Consultant shall anticipate various commissioning scenarios and in conjunction with the Project Manager shall liaise with the Wastewater Services with respect to commissioning activities that impact on licensing compliance.