Pr8871 - Specification for Commissioning of Network Project Assets

Unitywater

Pr8871 - Specification for Commissioning of Network Project Assets

Document Details

This document is only valid on the day it was printed.

Document Sponsor	Infrastructure Technical Standards Committee
Document Owner	Manager Capital Delivery
Subject Matter Expert	Project Services Unit Leader – Capital Delivery
References	**External documents:** *Workplace Health and Safety Act 2011;* *Workplace Health and Safety Regulation 2011;* *Water Supply (Safety and Reliability) Act 2008;* *Environmental Protection Act 1994;* *Queensland Building Services Authority Act 1991;* *Workplace Health and Safety Queensland Code of Practice; Managing noise and preventing hearing loss at work 2011;* *Workplace Health and Safety Queensland Code of practice; Scaffolding Code of Practice 2009;* SEQ Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code) including; • SEQ WS&S D&C Code Asset Information Specification; • SEQ IPAM List (SEQ approved Infrastructure Products and Materials List); • SEQ WSA03-2011-3.1 Appendix 'I' Disinfection of Water Mains, Water Quality Compliance Specification. Water Services Association of Australia (WSAA) National Codes. Water Services Association of Australia (WSAA) Guideline: Dechlorination of Drinking Water to Discharged Waterways, National Guidance for the Urban Water Industry 2019. **Unitywater documents:**

F8607	Project Deliverables Checklist – As Built Documentation
Pr9902	Specification for Civil and Earthworks
Pr9903	Specification for Building and Structural works
Pr9875	Specification for Non-Pressure Pipe Construction
Pr9904	Specification for Pressure Pipeline Construction
Pr9380	Specification for Electrical Installations at Network Sites
Pr9835	Specification for Installations at Sewage Treatment Plants
Pr9693	Specification for Mechanical Installations
Pr9080	CAD Drafting Standard

Pr8871 - Specification for Commissioning of Network Project Assets

Pr8701	Specification for Asset Information
Pr9078	Specification for As Constructed Information (STP's Only)
Pr8874	Specification for Commissioning and Handover Requirements for Treatment Plants
Pr9079	Specification for Commissioning of New Water Mains
Pr9032	Procedure for determination of acceptability of new water mains
F10045	Water Quality Mains Commissioning Form
F9785	Water Hygiene Field Guide (5C's)
Pr9833	Specification for SCADA and PLC Architecture
Pr9834	Specification for SCADA Standard
Pr9844	Specification for SCADA and PLC Device Type (Siemens)
UWDMDR-D-TS-0002[4]	Treatment Plant PLC and SCADA Specification
Pr9845	Specification for SCADA and PLC Implementation
Pr9846	Specification for SCADA Historian and Reporting
Pr9787	Specification for Microtunnelling and Pipejacking
Pr9788	Specification for Horizontal Directional Drilling
Pr9789	Specification for Auger Boring
Pr9790	Specification for Pipe Ramming
Pr9825	Specification for Shafts
Pr10068	Specification for Water Meters
Pr9821	Specification for Reservoir Design and Construction
F8940	OF and EMS Commissioning Check Sheet
F8941	PRV Commissioning Check Sheet
F8943	SPS Commissioning Check Sheet
F8945	WPS Commissioning Check Sheet
F8917	OF and ES Worksheet
F8922	PRV Worksheet
F8924	SPS Worksheet
F8927	WPS Worksheet

Pr8871 - Specification for Commissioning of Network Project Assets

Contents

1. GENERAL

Any Network Project Asset can be categorised into one of the following two asset types:

(1) Active assets; or

(2) Passive assets.

Active Assets typically include electrical, mechanical and control systems and the interaction of such systems must be demonstrated during the commissioning process. Examples of assets falling under the active asset category include:

- Pumping stations;
- Pressure regulating installations;
- Dosing/ Treatment systems;
- Flow meter installations;
- Reservoir sites.

Passive Assets generally don't include any electrical, mechanical or control systems. The commissioning process for passive assets is generally limited to demonstrating that the newly constructed asset is safe to be brought into service. Examples of assets falling under the passive asset category include:

- Water mains;
- Sewer rising mains;
- Sewer gravity mains.

The commissioning process differs considerably between the two asset categories. The commissioning process for active and passive assets is specified in Sections 2 and 3.

2. COMMISSIONING OF ACTIVE ASSETS

The general commissioning process for active assets is specified below.

2.1 COMMISSIONING PLAN

The purpose of the Commissioning Plan is to provide direction for the commissioning process, providing resolution for issues such as scheduling, roles and responsibilities, lines of communication, reporting, approvals, test acceptance criteria and coordination.

A project specific Commissioning Plan shall be produced by the Contractor. The Commissioning Plan shall be developed in the early construction phase and fine-tuned with added detail as construction progresses. The Commissioning Plan is to undergo review by Unitywater throughout the development process and must be approved by Unitywater prior to commencement of commissioning activities.

The detailed Commissioning Plan shall address, at minimum, the following where applicable:

- Commissioning team information, responsibilities, protocols and authority;

- Components to be commissioned and define responsibilities (e.g. SCADA integration by Unitywater);
- Environmental, safety and quality considerations;
- Commissioning risk assessment;
- Commissioning schedule and sequence of activities to provide logical and systematic testing;
- Commissioning Check Sheets (test procedures and checklists for factory acceptance testing (FAT), Pre-commissioning and Wet Commissioning);
- Note: Commissioning Check Sheet Templates containing test procedures and checklists will be provided by Unitywater where available.
- Performance requirements to be demonstrated during testing and acceptance criteria;
- Sourcing of water/recycled water required for commissioning;
- Discharge of testing water (disinfection water and flushing);
- Required interruptions to normal system operation and process (Network Interventions);
- Unitywater witnessing of tests (SAT);
- Commissioning information/documentation deliverables;
- Training; and
- Reliability Trials and acceptance criteria.

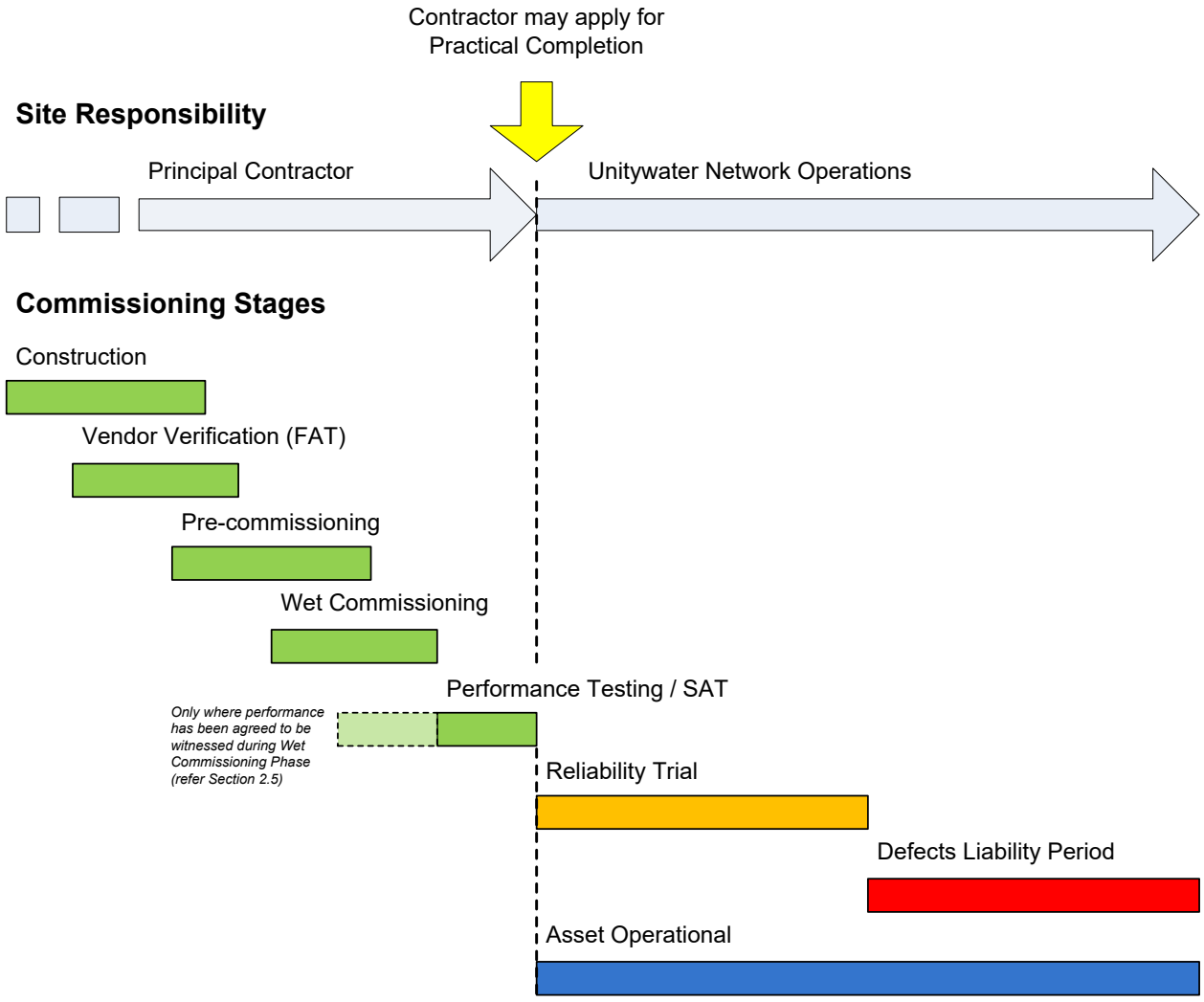
2.1.1 Commissioning Check Sheets

Where available, Commissioning Check Sheet Templates will be provided by Unitywater for each phase of commissioning. Testing requirements and Unitywater's minimum expectations are captured in these templates. The Contractor shall utilise these templates and make adjustments if necessary to meet project specific requirements. A complete set (all commissioning phases) of project specific Commissioning Check Sheets shall be submitted to Unitywater for approval a minimum of (2) weeks prior to commencement of commissioning activities.

Upon completion of each commissioning phase, the relevant completed Commissioning Check Sheet shall be submitted to Unitywater for approval.

2.2 GENERAL COMMISSIONING SEQUENCE

Commissioning can be broken into a number of sequential activities. The Contractor shall follow this sequence during the commissioning process. A commissioning sequence diagram is shown below.



The purpose of each commissioning phase in the sequence is summarised briefly below.

- **Vendor Verification**

  During the Vendor Verification phase, any supplied equipment shall be verified to meet specifications. This includes verification of factory acceptance tests (FAT), mechanical component test certification, calibration certification etc.

- **Pre-Commissioning**

  The Pre-Commissioning phase involves ensuring that all equipment and systems supplied under the contract are installed and can operate in accordance with the specification prior to operation of the plant under service conditions. All functionality which can be confirmed in 'Dry' conditions (without water) shall be tested. The plant shall be fully prepared for commencement of 'Wet' Testing and Site Acceptance Testing (SAT).

- **Wet Testing**

  During this phase, all functionality of fully automatic operations shall be confirmed under actual service ('Wet') conditions. Performance of plant components shall be demonstrated to meet specifications. Plant shall be fully prepared for SAT.

- **Site Acceptance Testing (SAT)**

  Upon completion of 'Wet' Testing, general functionality and plant performance shall be witnessed by Unitywater.

- **Reliability Trials**

  During the Reliability Trial period, the commissioned plant is to be operated on a live system for a period of 28 days to prove that it operates consistently as intended. All necessary adjustments and fine tuning shall be carried out during this phase.

Additional detail on each of the above listed commissioning phases is provided in the subsequent sections.

2.3 VENDOR VERIFICATION

Vendor Verification is the process of verifying any vendor supplied items to be fit for purpose and functioning as per specifications. Vendor Verification may include but is not limited to:

- Verification of adequate Factory acceptance testing (FAT);

  During FAT, the vendor shall demonstrate that the system design and manufacturing meets the contract specifications. FAT is generally conducted at the place of manufacture;

- Verifying that test certificates have been received and meet requirements (e.g. pump and motor test certificates); and

- Verifying that all required calibration certificates have been received (e.g. flow meter calibration certificate).

Vendor Manuals (Equipment Operation and Maintenance Manuals) shall be made available for Vendor Verification.

2.4 PRE-COMMISSIONING

Pre-Commissioning is the preparation of plant or equipment so that it is in safe and proper condition and ready for 'Wet' Testing and SAT.

Pre-Commissioning includes all aspects of plant operation such as safety, electrical and mechanical equipment and instrumentation. The Contractor shall ensure that all labour, materials,

plant and equipment required for testing are available on the designated date of commencing Pre-Commissioning testing.

2.5 WET TESTING

After the satisfactory completion of the Pre-Commissioning tests and rectification of all Pre-Commissioning punchlist items, 'Wet' Testing with water shall commence.

Prior to the commencement of wet testing the Contractor shall ensure that:

- all instruments, alarm annunciators, protection equipment and interlocks supplied under this Contract are fully and reliably operational
- valves on piping infrastructure are proved to be isolated, under pressure, to prevent unintended discharge or leakage during wet testing
- Instruments supplied under this Contract shall be checked for correct operation and recalibrated as required

Wet Testing Check Sheets shall be signed off by Unitywater prior to commencement of SAT.

Note that in some cases, subject to agreement with Unitywater; 'Wet' Testing may be completed in conjunction with SAT as it may be impractical to undertake 'Wet' Testing independently of SAT due to the potential need for large volumes of test water. If this is the case, as much as practical of the plant operation sequences shall be tested in a 'Dry' environment prior to commencing 'Wet' Testing.

2.5.1 Site Walkover

Relevant Unitywater personnel shall attend a Site Walkover prior to commencement of SAT. All Defects shall be recorded on the Defects & Omissions Punchlist and classified as major or minor. Defects which are likely to impact on successful SAT shall be corrected prior to the commencement of SAT.

2.6 SITE ACCEPTANCE TESTING (SAT)

Upon Unitywater signoff on successful completion of 'Wet' Testing, the Contractor shall demonstrate to Unitywater that the plant is performing as per the specification and that the plant satisfies all Statutory Regulations. During this phase, Unitywater staff will be in attendance to witness and to gain familiarity with the proper operation and maintenance of the plant.

Additional items identified during SAT are to be recorded in the Defects & Omissions Punchlist.

Upon completion of SAT, the Contractor shall provide a complete list of control instrument set points and alarm signal settings which have been determined during the successful operation of the plant and include these in the commissioning documentation.

2.7 RELIABILITY TRIAL

Once Site Acceptance Testing has been completed and the plant is running to the satisfaction of Unitywater, a trial period shall follow, during which time the plant shall be operated as a complete unit and all equipment shall be run on a continuous basis as close as practicable to anticipated full-

load conditions. The Trial duration shall be 28 days unless specified otherwise. The Trial shall be carried out as soon as practicable following SAT.

The Contractor shall provide Unitywater with a minimum of seven days' notice in writing of intention to start the Trial. The Trial shall not commence until:

- SAT is complete;
- Operator Training has been completed (where applicable);
- Detailed Operating and Maintenance Manuals have been submitted;
- Major defects have been addressed.

During the Reliability Trial, the asset will be under Unitywater control. The Defects Liability period will commence upon successful completion of the Reliability Trial.

2.7.1 Staffing Requirements during the Reliability Trial

Unitywater shall provide without cost to the Contractor, normal operating staff for operating the plant. The cost of all chemicals, power and water services for the full duration of the Trial period shall be borne by Unitywater. Unitywater may elect to record an independent set of test results for evaluation. The Contractor shall ensure that experienced and qualified personnel are available at all time during the Trial operation for the purpose of supervision, adjustment and remedial work as required.

3. COMMISSIONING OF PASSIVE ASSETS

3.1 WATER MAINS

Commissioning of water mains shall be in accordance with Unitywater's *'Pr9032 Procedure for Managing Water Quality During Mains Commissioning'.*

Commissioning of water mains typically includes the following activities:

- Disinfection (super-chlorination and purging of pressure test water);
- Flushing (purging of disinfection water);
- Water quality acceptance testing; and
- Bringing pipe/main into service.

A commissioning methodology shall be submitted by the Contractor and approved by the Unitywater Project Manager prior to commencing commissioning activities. The following shall be addressed in the methodology:

- Fill methodology for pressure test – how will the pipe/main be charged for pressure testing purposes;
- Disinfection methodology – how will the pipe/main be charged with super-chlorinated water;
- Water quality sampling – where and how will samples be taken;

- Discharge – how will water used for pressure testing, disinfection and flushing be purged (tanker, environment, on-site treatment, sewer);
- Final connection methodology – how will final connections be made and how will the pipe/main be flushed prior to bringing into service; and
- Scheduling of activities.

A typical sequence of activities is provided in *'Pr9032 Procedure for Managing Water Quality During Mains Commissioning'*. This typical sequence shall be adopted and modified to meet project specific requirements. The Contractor's responsibilities around commissioning are also defined in this specification.

Acceptance testing of water mains shall be in accordance with SEQ WS&S D&C Code, Water Supply Code, *Section 19 Acceptance Testing*.

3.1.1 Fire Hydrant Flow/Pressure Test

Where specified by the Superintendent, fire hydrants shall be tested in accordance with the requirements listed below.

- Metered Fire Hydrant Standpipes with capacity to record flow and pressure are to be used for Fire Hydrant Testing on a single hydrant point before, and after Mains or Fitting replacement works.
- Fire flows are generally expected to achieve 15 l/s in Residential areas and 30 l/s for Commercial/Industrial areas.
- Testing process to be conducted during peak demand between 6:00 a.m. – 10:00 a.m.
- Test records to be captured on the Contractor's ITP including:
  - Serial number of the Fire Hydrant test standpipe;
  - Location and asset number of the tested hydrant;
  - Static Pressure prior to commencement of test (including date & time);
  - Slowly discharge the fire hydrant test water at 5 l/s and record duration and pressure;
  - Increase flow at 5 l/s increments until maximum flow is achieved and record duration and pressure for each increment.

All fire flow testing discharges to be in accordance with Water Services Association of Australia (WSAA) Guideline: Dechlorination of Drinking Water to Discharged Waterways, National Guidance for the Urban Water Industry 2019.

3.2 SEWER MAINS

Prior to commissioning of sewer mains, valves are proved to be isolated, under pressure, to prevent unintended discharge or leakage in the network.

Commissioning of Sewer mains is generally limited to pressure testing and bringing into service.

Acceptance testing of sewerage pressure mains shall be in accordance with SEQ WS&S D&C Code, Sewage Pumping Station Code, *Section 36 Acceptance Testing*.

Acceptance testing of sewerage gravity mains shall be in accordance with SEQ WS&S D&C Code Sewerage Code of Australia, *Section 22 Acceptance Testing*.

4. COMMISSIONING HANDOVER DOCUMENTATION

The Contractor shall provide commissioning documentation and information in accordance with *'F8607 Project Deliverables Checklist – As Built Documentation'*.