

**[PROJECT NAME] [SITE NAME] [SITE TAG]**

**COMMISSIONING PLAN**

This commissioning plan template has been developed to be for **Water Booster Developer Pump Stations** and must be modified to suit each project.

Sections which cannot yet be completed shall be marked as TBC.

Wording in blue is intended to be modified or removed to suit the project.

|  |  |
| --- | --- |
| Prepared by | Role |
|  | Consulting Engineer |
| Reviewed by | Role |
|  | Watercare Senior Asset Engineer |
|  | Operations Controller – Northern/Central/Southern Networks – Water/WW |
|  | Watercare Control Systems Team Lead |

|  |  |  |  |
| --- | --- | --- | --- |
| Approved By | Watercare Services Ltd | Date | Sign |
|  | Developer Services Manager |  |  |
|  | Operations Commissioning Manager |  |  |
|  | Watercare Environmental Care Manager |  |  |
|  | [Construction Contractor] Project Manager |  |  |
|  | [Construction Contractor] Commissioning Manager |  |  |
| Approved For Use By | [Business Unit] | Date | Sign |
|  | Operations Manager Networks |  |  |

1. Introduction

This Commissioning Plan describes specific testing and commissioning for Water Booster Pump Station. Commissioning processes and roles and responsibilities are as described in the Watercare Code of Practice for Commissioning (ESF-700-STD-801) unless identified below.

1.1 Project Overview

*One Paragraph summarising relevant information e.g.*

Overview of assets to be delivered.

The project is going to deliver a Water booster pump station. The assets to be delivered shall include inlet suction pipework an associated valve, storage tank, three pump sets complete with controls, electrical control panels, backup power generator, pressurised tank/accumulator, discharge pipework into the transmission mains, control and isolation valves, and measuring flow metering. The project shall also deliver a pump house building that shall be gated and fenced. Access roads shall be provided to the pump station.

The booster station is [a new development/ upgrade] project. It shall be tied-into the existing Watercare network mains and connected to the electricity grid.

The purpose of the project is to boost water pressure in the network in order to support development houses and meet fire hydrant pressure requirements. Greenfield or upgrade? Issues with any existing infrastructure.

The booster pump station is designed to deliver [insert flow rate] litres per second as a pressure of [insert pressure] bars. Three pumps shall be installed and operate on [duty/duty assist/standby] and shall be [pressure/flow/level] controlled. Pump restart shall be limited to [number of starts] per hour. RTUs shall relay data to the Watercare control room via telemetry to enable remote control using SCADA.

Water quality requirements e.g. UV disinfection used for protozoal and bacterial barrier (sections 4.10.1.4 and 4.10.2.13 of the Drinking Water Quality Assurance Rules).

Water tank and pipework shall be disinfected to Watercare CoP-04 for disinfection before discharging into the network. Samples can be taken through [state points] provided.

Include Process/Plant Flow Diagram

[Insert P&ID]

# 

1. Commissioning Process

Installation completion, Pre-commissioning and Cold Commissioning will be completed by the Developer.

2.1 Factory Acceptance Testing (FAT)

Assets subjected to FAT prior to delivery include switchboards, software, switches, actuated valves, flow meters, and pressurised vessel (tank). (list any other equipment that reaches Watercare standards for FAT).

* 1. Site Acceptance Testing (SAT)

The following asset packages are subject to SAT prior to cold commissioning *(list these)*.

* Pump and motor control set.
* Actuated valves
* Standby generator
* Lifting devices

SAT documents will include completed test sheets and additional supporting documentation e.g. diagnostic software.

* 1. Installation Completion and Pre-Commissioning (IC / PC)

Test records (ITRs) for all individual assets will confirm that installation is in accordance with Watercare requirements.

Assets may then be livened and pre-commissioned using Watercare approved PC ITRs. This will include *(delete if not applicable for this project)* leak testing; installation of process control system software; instrument set-up and calibration; electrical circuits; actuated valves and gates testing, limits and indications set; VSD’s are livened; electrical protection settings tested; motors and pumps bump tested, and test runs completed.

Completed ITRs and supporting documentation are collated into a completion dossier before moving to the next stage.

* 1. Cold commissioning

Using a safe fluid, test the trips/interlocks and control loops. Each system is separately confirmed ready for hot commissioning.

A temporary closed pumping loop to allow recirculation of water will be used to test pressure, flow, and input & output controls. This loop will be isolated from the network. It will consist of throttling valve to simulate head losses.

Pump cut-in and cut-out pressure shall be set at [insert] bar and [insert] bar respectively.

When all systems functions have been tested, the water shall be chlorinated to Watercare water quality requirements prior to hot commissioning.

*If this is to be staged, give high level summary of staging.*

* **Internal WSL Milestone and Hold Point – Ready for Hot Commissioning.** 
  1. Hot commissioning

Plant will be started-up and operated in automatic mode on process fluid. All remaining functionality testing is completed. *List any exceptions.*

*If this is to be staged, give high level summary of staging.*

Acceptance to service will be applied forwhen water quality requirements have been met*.*

* **Internal WSL Milestone and Hold Point – acceptance to service.**

After acceptance to service, the remaining ties ins and any last functionality checks. *(project specific summary)*

The Watercare site operations team WSL-O are responsible for routine operation and on-call alarms with support from the Commissioning Team.

* **Internal WSL Milestone – provisional takeover**

* 1. Provisional Takeover

The Project demonstrates stable, reliable and safe operation with no critical faults or alarms.

After provisional takeover, WSL-O will be responsible for operation and maintenance of the Pump Station. If WSL-O are unable to resolve any issue or there are potential contractual implications the affected equipment will be left out of service if it is safe to do so. If it is not possible to leave the equipment out of service, the WSL-C on-call personnel will be contacted.

* 1. Performance proving period

The following project specific performance proving has been agreed:

*e.g. 5 days continuous automatic operation.*

*Define who will monitor results.*

*Define the process for non-conformances. Will the test restart from scratch?*

* **Internal WSL Milestone – final handover**

1. Performance Requirements

The following performance specifications are required to be met by the project.

*Table 1: Performance Requirements*

|  |  |
| --- | --- |
| **Stage** | **Performance Parameters and Measures** |
| **Cold/Hot Commissioning** | Design Pressure and flow achieved in network by pumps.  Pressure switch cut-in and cut out functionality at set points.  Pressure relief valve performance at set pressure.  Automatic operation mode functionality  Pump multi-duty operation.  Remote operation via SCADA  Emergency stop buttons.  Generator auto kick-in  Vibration monitoring at testing [vibration velocity shall not exceed 1mm/s]  Noise test/survey [Equivalent to 85dbA average over 8hrs/max. specified by resource consent/ 45 dB LAeq (15min)] |
| **Performance Proving** | All systems to function autonomously for [insert agreed period]. |

1. Commissioning Team

4.1 Roles and Responsibilities

The commissioning team communication structure, contact details and roles and responsibilities are included below. Detailed role descriptions are in the Watercare Commissioning Code of Practice (ESF-700-STD-801).

*Table 2: Roles and Responsibilities*

|  |  |  |
| --- | --- | --- |
| **Role** | **Company** | **Name** |
| Development Engineer | Watercare |  |
| Project Manager | *[Contractor]* |  |
| Commissioning Engineer | *[Contractor]* |  |
| Commissioning team Lead | *[Contractor]* |  |
| Mechanical Commissioning | *[Contractor]* |  |
| Electrical Commissioning | *[Contractor]* |  |
| Instrumentation Commissioning | *[Contractor]* |  |
| Control System Engineer | *[Contractor]* |  |
| Design Consultant | *[Design Consultant]* |  |

* 1. Specialist Suppliers *(if applicable)*

The following specialist product suppliers will liaise with the [Contractor] commissioning engineer for specialist testing and commissioning:

*Table 3: Specialist product suppliers*

|  |  |  |
| --- | --- | --- |
| **Supplier Name** | **Equipment** | **Agreed support** |
| [Insert supplier] | Pumps |  |
| [Insert supplier] | VSD |  |
| [Insert supplier] | Flow and level instrumentation |  |
| [Insert supplier] | Switchboard |  |
| [Insert supplier] | Security system |  |
| [Insert supplier] | Fire system |  |
| [Insert supplier] | Pressurised tank |  |
| [Insert supplier] | Lifting Equipment and Beams |  |

1. Commissioning Staging

*High level commissioning philosophy including sequencing of the works. This section can be further developed as the design is firmed up.*

*Include any statutory testing required for external certification i.e. site certificates for chemical systems, lifting equipment, pressure vessels etc.*

The commissioning systems and subsystems have been identified in the table below.

*Potential water pump station process areas and auxiliary systems are listed below. The process groups number needs to corelate with those used in the P&ID’s and tag numbering etc. Delete/add systems from following table as applicable to this particular project.*

*Table 4: Commissioning Systems and Sub-Systems*

|  |  |  |
| --- | --- | --- |
| **System** | **Sub-System** | **Description** |
| 00 | 00-xx | Site General – buildings (civil/electrical/mechanical) and roads etc. |
| 01 |  | Control Systems (DCS, SCADA, Telemetry RTU’s, PLC’s etc.) |
| 02 |  | Electrical - e.g. DB’s, JB’s, MCC’s, & Field Cabinets (not specifically related to a process/ functional area) |
| 03 |  | Site Services – e.g. Compressed Air |
| 04 |  | Service Water/Potable Water - used in the process e.g. chemical flushing, site amenities etc. |
| 05 |  | Fire & Security |
| 06 |  | IS Network Management |
| 08 |  | Heating Venting and Air Conditioning (HVAC) |
| 14 |  | Electrical Generation |
| 89 |  | Boundary valve – pressure/supply |
| 92 |  | Treated Water Line Valving |
| 93 |  | Treated Water Supply Points |
| 94 |  | Treated Water Flow Control |
| 95 |  | Treated Water Flow Metering |
| 96 |  | Treated Water Cross-connection |
| 97 |  | Treated Water Surge Protection (Tanks, Valves etc.) |
| 99 |  | Cathodic Protection System |

* 1. Commissioning Discharges

The following temporary discharges to trade waste/stormwater/waterway have been identified:

*Table 5: Temporary Discharges*

|  |  |  |
| --- | --- | --- |
| **Discharge** | **Type** | **Consent requirement** |
|  |  |  |

Any discharges need to meet resource consent requirements. No chlorinated water to be discharged to the environment or stormwater system.

* 1. Temporary Recirculation Requirements

Dedicated recirculation lines will be required to enable commissioning of the following assets. A valve and/or orifice plate will be installed to simulate the pressure expected in the rising main. The recirculation pipe size has been designed to supplement the pressure simulation required.

* 1. Commissioning Resources Requirement

*List specialist resources required for commissioning especially long lead items. Might include supplier personnel, sampling equipment.*

*Table 6: Resources Required*

| **Resources/Setup** | **Purpose** | **Quantity** |
| --- | --- | --- |
| **Equipment** | | |
|  |  |  |
| **Testing fluids, Chemicals and Lubricants** | | |
|  |  |  |
| **Temporary Connection or Pipeline** | | |
|  |  |  |

* 1. Tie-Ins

Tie-in work affecting any existing treatment plant, piping or control system is summarised in the Table below, identified in the project programme and a Change to System Risk Profile (CSRP) approved.

Each critical tie-in activity requires a methodology (text and drawing), and a risk assessment prepared by [Contractor].

*Table 7: Tie-in List*

| **Tie-in No** | **Tie-in Description** | **Drawing No**  **Ref. No.** | **Description of Criticality** |
| --- | --- | --- | --- |
| **Process Tie - Ins** | | | |
| T-01 | [Insert description] | [Insert description] | [Insert description] |
| T-02 | [Insert description] | [Insert description] | [Insert description] |
| Electrical and Control Tie - Ins | | | |
| E-01 | [Insert description] | [Insert description] | [Insert description] |
| E-02 | [Insert description] | [Insert description] | [Insert description] |
| Security and Fire System Tie - Ins | | | |
| S-01 | [Insert description] | [Insert description] | [Insert description] |
| S-01 | [Insert description] | [Insert description] | [Insert description] |

1. Environmental Considerations

6.1 Consents

*List current and new discharge consents. Ensure that consents are in place for discharges identified above as required.*

1. Health and Safety

7.1 Transfer of Control of Works (for current operational sites only)

It has been agreed that the following work areas can be isolated from site operations and signed over by the [Area] production manager to WSL-P. Within these areas all personnel must follow the [Contractor] control of works processes. For project work areas that cannot be handed over to the Watercare project team, WSL-O will continue to manage Health and safety using the Watercare Control of Works processes. Control of work delineations are identified in the plan below.

*Site plan showing area delineations.*

* 1. Isolations

Isolations for existing assets are to be applied and controlled by WSL-O using the Watercare isolation procedure.

When the control of works is handed to WSL-O all in place isolations must be transferred to the site operations system.

Only people that have been designated as Authorised Persons are able to apply isolations.

* 1. Control System Change Request (CSCR) Application

A Control System Change Request (CSCR) with attached Approved Document Register (ADR) will be submitted to the WSL controls system engineer prior to any modifications or tie ins to the control system.

* 1. Risk Assessment and Register

The Commissioning Lead will facilitate commissioning risk assessment workshops at least 10 days prior to commissioning work starting. Commissioning risks will be logged on a commissioning risk register and reviewed regularly. Commissioning risks with sufficient project impact will be elevated to the project risk register.

1. Training

The following equipment has been identified as being novel to the operating area and hence training will be provided as per the requirements of COP-03

*Table 8: Training register*

|  |  |  |
| --- | --- | --- |
| **Equipment / Process** | **Supplier** | **Practical / classroom/ online** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |