

TEM515

FUNCTIONAL SPECIFICATION TEMPLATE

(SPS Site Specific Functional Specification Template)

Project Document Name:

SPXXX Street St

PUMPING STATION

Project Document Number (Insert Q–Dox Number here)

**Internal Revision Control**

|  |  |  |  |  |  |  |
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| **Rev** | **Date** | **Purpose** | Company | **Prepared** | **Reviewed** | **Approved\*** |
| A | 23/12/2014 | Draft - Issued for Review | XYZ | David XXX | John XXX | John XXX |
| B | 23/01/2014 | 30% Design | XYZ | David XXX | John XXX | John XXX |
| C | 21/02/2014 | 80% Design | XYZ | David XXX | John XXX | John XXX |
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| 02 |  |  |  |  |  |  |

* Approver must be an electrical RPEQ

Document Consultation

Please review this document and add your comments where necessary. To ensure that this project is completed on time, please forward your comments by the requested date to: Document Administrator

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THIS SECTION IS TO BE DELETED BY THE CONTRACTOR

This document has been provided as a template for standard Network sites where a standard functional specification exists or where the site is deemed non-complex. QUU acceptance must be obtained to determine if a site can be classified as a non-complex site. The document is based on a sewage pump station functional specification and can be modified to suit alternate site types. This document is an example of the minimum level of detail expected for a standard Network site or non-complex site functional specification. The Contractor shall use the format of the document as close as reasonably possible to suit the project. The Contractor may propose an improved format for written acceptance by QUU as long as minimum requirements are met.

Refer to TMS1202 Control Systems Implementation Specification for further Functional Specification Guidelines.

# Introduction

## Document Purpose

The purpose of this document is to define the following items for this site:

* Local Control Systems Functionality
* Local HMI Functionality
* Remote SCADA Functionality

The document detail shall be sufficient such that reverse engineering of the code is not required to fully understand the control systems operation. All assumptions and references are provided in this document.

This specification contains the site specific details and describes the non-standard functional requirements (where a standard exists) for control, monitoring and telemetry at the station. Where the functional requirements for this site are based on a standard functional specification then this document must be referenced here! The functionality for this site adheres to this standard (where applicable) unless specifically stated otherwise in this document.

This functional specification has been developed for SPXXX St as part of the program “XXXXX Sewage Pump Stations Upgrade 123 – Somerset, Scenic Rim and Lockyer Valley”. The Project will …. replace the existing switchboard with the new standard design switchboard…..

All standard design options that are applicable to this site are detailed in this specification along with all the site specific values required for the correct operation of this station.

## Abbreviations

In this document, the following acronyms and abbreviations apply ***(to be updated as required)***:

Table 1: Abbreviations

|  |  |
| --- | --- |
| Abbreviation | Meaning |
| BWL | Bottom Water Level |
| DOL | Direct On Line |
| FAT | Factory Acceptance Test |
| I/O | Inputs & Outputs |
| mAHD | Metres above Australian Height Datum |
| MCC | Motor Control Centre |
| MSB | Main Switch Board |
| OOS | Out Of Service |
| PLC | Programmable Logic Controller |
| PID | Proportional Integral Derivative regulatory control |
| QUU | Queensland Urban Utilities |
| RTU | Remote Telemetry Unit |
| SCADA | Supervisory Control and Data Acquisition |
| SP | Set point |
| TWL | Top Water Level |
| UPS | Uninterruptible Power Supply |
| UUTS | Urban Utilities Telemetry System |
| VSD | Variable Speed Drive |

## Definitions

In this document, the following definitions apply ***(to be updated as required)***:

Table 2: Definitions

|  |  |
| --- | --- |
| Term | Meaning |
| Equipment Interlocks | A software and hardware protection mechanism which protects the device from an unsafe condition. Typically the device will be locked out from operation, alarmed and generally require a reset.  |
| Remote Manual Control | Refers to control from the Remote (offsite) SCADA screen |
| Local Manual Control | Refers to control from the Local HMI screen or local pushbutton controls. |

##

## Reference Documents

This document is to be read in conjunction with the following ***(to be updated as required)***:

Table 3: Reference Documentation

| Doc Number | Description | Rev |
| --- | --- | --- |
| SSM084 XXX | Standard Functional Specification XXX | X |
|  | Process Control Narrative |  |
|  | PSA Report |  |
|  | Radio Survey Report |  |
|  | Communications Architecture Report  |  |
|  | Instrument List |  |
|  | Instrument Datasheet |  |

## Site Location

SPXXX Street St is a small regional sewage pump station located in Lot 29 RP7740 Street St, Toogoolawah. The existing switchboard was built in 1972.



Figure 1: Location Map

# Standard Design Options

The standard design options checked in the table below have been included in the design for SPXXX Street St. The functional detail of each option is fully specified in the standard specification, “SSM084 Standard Sewage Pump Station - Functional Specification” and the options have also been incorporated into the electrical schematics for this site (See Appendix A Drawing List).

**NOTE if a Standard Functional Specification does not exist then full details of the site specific functionality must be included here and the section title will change. QUU currently has standard functional specifications for the majority of Network assets i.e. :**

* **Sewage Pump Stations (SSM084)**
* **Water Reservoirs (TMS828)**
* **Water Pump Station (TMS1634)**
* **Water Boosters (WBVS1)**

**NOTE Standard site specific templates will exist for each of the above standard functional specifications. The following is based on SSM084.**

Table 4: Standard Options for a Sewage Pumping Station

|  |  |  |
| --- | --- | --- |
| Option | Required | Description |
| A | - | Individual pump moisture in oil (MIO) sensor and fault relay |
| B | - | Individual pump moisture in stator (MIS) sensor and fault relay and/or bearing temperature fault sensor and fault relay |
| C | - | Individual pump reflux valve micro switch |
| D1 | - | Upstream Manhole Surcharge Imminent Probe |
| D2 | - | Upstream manhole surcharge imminent – Electrode |
| E | - | Station dry well sump pump and level indication sensors and relays |
| F | - | Station permanent generator (ATS and control connections) |
| G | - | Emergency Storage Level Sensor & Dewatering Pump |
| H | - | Station delivery flow meter |
| I | 3G | Backup Communication Options |
| J | De-Con | Pump Connection Method (Direct / De-Con / Field / IDC)(Direct/De-Contactor/Field Disconnect/Integrated Disconnection Cubicle) |
| K | - | Cathodic Protection |
| L | - | Motor Thermistor |
| M | - | Odour Control |
| N | - | Current Transformer (CT) metering |
| O1 | -\* | Pumps Fully interlocked |
| O2 | - | Pumps Interlock with Genset Only |
| P | - | Wet Well Washer |
| Q | - | Valve Pit Sump Pump and Level  |
| R | Rad-Tel | Telemetry Radio (High / Low / No) |
| S | - | Wet Well Secondary Level Sensor (Radar) |
| T | YES | Wet Well Primary Level Sensor (Hydrostatic) |
| U | - | Delivery Pressure Transmitter |
| V | - | Chemical Dosing |
| W | - | Variable Speed Drives |
| X | - | Third Pump |
| Y | - | Power Meter |

\*There is only 1 pump

For a full list of equipment installed on site refer to the equipment list in the site electrical drawings.

#

# Site Details

### Network Details

|  |  |
| --- | --- |
| Sewer Scheme | QUU to Provide |
| Macro Catchment | QUU to Provide |
| ADWF | QUU to Provide |

### Pump Details

|  |  |
| --- | --- |
| Pumps Size  | 1 x 1.1kw |
| Dry Weather Hrs | Site Survey |
| Avg Pump Cycle | Site Survey |
| Design Duty Point | Site Survey |

### Generator

|  |  |
| --- | --- |
| Generator Size | N/A |
| Number of Pumps that can run | N/A |

###  Site Control Levels

#### Wet Well

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Description | Existing  | SAT Testing | Proposed Final Levels | Units |
| Range | Site Survey | Site Survey | Site Survey | m |
| Surcharge occurring level | Site Survey | Site Survey | Site Survey | mAHD |
| Surcharge imminent level | Site Survey | Site Survey | Site Survey | mAHD |
| Inhibit mode start level | Site Survey | Site Survey | Site Survey | mAHD |
| Emergency Storage Inlet Level | N/A | N/A | N/A | mAHD |
| Inhibit mode stop level | Site Survey | Site Survey | Site Survey | mAHD |
| Pump Run at Max | N/A | N/A | N/A | mAHD |
| PID Setpoint | N/A | N/A | N/A | mAHD |
| High alarm level | Site Survey | Site Survey | Site Survey | mAHD |
| Duty B pump start level | N/A | N/A | N/A | mAHD |
| Duty A pump start level | Site Survey | Site Survey | Site Survey | mAHD |
| Duty B pump stop level | N/A | N/A | N/A | mAHD |
| Duty A pump stop level | Site Survey | Site Survey | Site Survey | mAHD |
| Low alarm level | Site Survey | Site Survey | Site Survey | mAHD |
| Wet well empty level (4mA of Probe) | Site Survey | Site Survey | Site Survey | mAHD |

#### Flow meter

|  |  |  |
| --- | --- | --- |
| Description | Flow | Units |
| Range | N/A | l/s |
| Minimum Value (4mA) | N/A | l/s |
| Flow high alarm limit | N/A | l/s |
| Flow low alarm limit | N/A | l/s |

#### Pressure Gauge

|  |  |  |
| --- | --- | --- |
| Description | Pressure | Units |
| Range | N/A | m |
| Minimum Value or elevation (4mA) | N/A | mAHD |
| Pressure high alarm limit | N/A | mAHD |
| Pressure low alarm limit | N/A | mAHD |

#### Sewer Pump

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Description | Pump 1 | Pump 2 | Pump 3 | Units |
| Current high alarm limit | N/A | N/A | N/A | A |
| Current low alarm limit | N/A | N/A | N/A | A  |
| Power high alarm limit | N/A | N/A | N/A | kW |
| Power low alarm limit | N/A | N/A | N/A | kW |
| Pump blocked alarm limit | N/A | N/A | N/A | l/s |

#### Flow and Speed Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Description | 1 Pump | 2 Pumps | Units |
| Minimum Flow | N/A | N/A | l/s |
| Maximum Flow | N/A | N/A | l/s |
| Minimum Speed | N/A | N/A | Hz |
| Maximum Speed | N/A | N/A | Hz |

# Non Standard Design

The following sections will define any non-standard requirements for the site.

***NOTE if a Standard Functional Specification does not exist then this section may not be required and the headings below collated to Sections 2 and 3 above.***

## Equipment

This site is standard with the standard design options implemented as detailed in Section 2: Standard Design Options. (Refer to site-specific physical IO list developed for this site). Otherwise list here.

This site has only one pump etc.

## Control Functions

This site has standard control functions as per the standard specification …..“SSM084 Standard Sewage Pump Station - Functional Specification”.

Otherwise list here.

## Monitoring and Alarms

This site has standard monitoring and alarm points as per the standard specification.

Otherwise list here.

## Calculations

This site has standard calculations as per the standard specification.

Otherwise list here.

## HMI User Manual (Local Display)

This site has a standard local display HMI as per the standard specification.

Otherwise indicate all screens here. Refer to TMS1202 for content required in the HMI user manual for a local HMI.

## Software Design Specification

Refer to TMS1202 for minimum content.

# SCADA Definition

The following sections will define the SCADA requirements for the site i.e. UUTS, ClearSCADA, Radtel etc.

## SCADA Points List

This site has a standard SCADA points list as per the standard specification.

Otherwise list here and refer to TMS1202.

## SCADA Alarm Instructions

This site has standard SCADA alarm instructions as per the standard specification.

Otherwise list here and refer to TMS1202.

## SCADA Picture

This site has a standard SCADA picture as per the standard specification.

Otherwise list here.

## SCADA Trends / Reports

This site has a standard SCADA Trends / Report requirements as per the standard specification.

Otherwise list here.

# Sewer Network Overview

QUU TO PROVIDE

Figure 2: Network Overview

1. Drawing List

To determine the latest revision of each drawing, refer to the drawing index – SHEET 00.

|  |
| --- |
| Electrical Drawing List |
| Sheet # | Drawing # | Title |
| 00 | 486/5/7-0542-000 | Site Cover Sheet |
| 01 | 486/5/7-0542-001 | Power Distribution Schematic Diagram |
| 02 | 486/5/7-0542-002 | Pump 01 Schematic Diagram |
| 03 | 486/5/7-0542-003 | *Reserved Drawing Sheet* |
| 04 | 486/5/7-0542-004 | *Reserved Drawing Sheet* |
| 05 | 486/5/7-0542-005 | *Reserved Drawing Sheet*  |
| 06 | 486/5/7-0542-006 | MTS Control Wiring Diagram |
| 07 | 486/5/7-0542-007 | Common Controls Schematic Diagram |
| 08 | 486/5/7-0542-008 | Common RTU I/O Schematic Diagram |
| 09 | 486/5/7-0542-009 | RTU Power Distribution Schematic & Network Diagram |
| 10 | 486/5/7-0542-010 | RTU Digital Inputs Termination Diagram – Sheet 1 of 3 |
| 11 | 486/5/7-0542-011 | RTU Digital Inputs Termination Diagram – Sheet 2 of 3 |
| 12 | 486/5/7-0542-012 | *Reserved Drawing Sheet* |
| 13 | 486/5/7-0542-013 | RTU Digital Outputs Termination Diagram – Sheet 1 of 2 |
| 14 | 486/5/7-0542-014 | RTU Digital Outputs Termination Diagram – Sheet 2 of 2 |
| 15 | 486/5/7-0542-015 | RTU Analogue Termination Diagram |
| 16 | 486/5/7-0542-016 | RTU Analogue Termination Diagram |
| 17 | 486/5/7-0542-017 | Common Controls Termination Diagram |
| 18 | 486/5/7-0542-018 | Equipment List  |
| 19 | 486/5/7-0542-019 | Cable Schedule  |
| 20 | 486/5/7-0542-020 | Switchboard Label Schedule |
| 21 | 486/5/7-0542-021 | Switchboard Construction Details – Sheet 1 of 3 |
| 22 | 486/5/7-0542-022 | Switchboard Construction Details – Sheet 2 of 3 |
| 23 | 486/5/7-0542-023 | Switchboard Construction Details – Sheet 3 of 3 |
| 24 | 486/5/7-0542-024 | Field Instrumentation - Installation Details |
| 25 | 486/5/7-0542-025 | *Reserved Drawing Sheet* |
| 26 | 486/5/7-0542-026 | *Reserved Drawing Sheet* |
| 27 | 486/5/7-0542-027 | *Reserved (Field Disconnection Box)* |
| 28 | 486/5/7-0542-028 | *Reserved Drawing Sheet* |
| 29 | 486/5/7-0542-029 | Switchboard General Arrangement Elevations |
| 30 | 486/5/7-0542-030 | Switchboard General Arrangement Sections |
| 31 | 486/5/7-0542-031 | *Reserved (Generator External Connection Box)* |
| 32 | 486/5/7-0542-032 | Switchboard Site Installation Clearance Requirements |
| 40 | 486/5/7-0542-040 | *Reserved Switchboard Slab – Locality & Site Plans – Sheet 1 of 3* |
| 41 | 486/5/7-0542-041 | *Reserved Switchboard Slab and Conduit Details – Sheet 2 of 3* |
| 42 | 486/5/7-0542-042 | *Reserved Switchboard & Electrical Conduit Layout – Sheet 3 of 3* |

1. Physical I/O List