*Document Guidelines (delete these prior to finalising document)*

*Blue Text*

*The blue text provides guidelines on how to complete this document.*

*All blue text to be deleted when no longer needed, prior to finalising the project-specific document.*

Yellow Highlighted Text

Text highlighted in yellow shall be reviewed/completed. The highlighted areas are where project-specific information shall be added/deleted or where information should be checked for relevance and/or currency.

Black Text

Black (not highlight) text should not be altered without consultation with Urban Utilties. This text serves to provide both standard information for design and technical specifications. Approval in writing must be obtained from Urban Utilities for any changes or variations from requirements that are indicated in black text. Any such variations, reasons for variations and written approvals must be recorded in Appendix 5 of this document.

*Notes*

*The “Template Revision Table” must appear on the bottom of the cover page.*

*Do not leave table cells blank. If there is no relevant information, add “-“ or “Not Applicable” (NA). Where data is not available at the time of drafting the project specific BoD, Indicate “To be confirmed” (TBC).*

*Do not leave any sections blank. Write a statement indicating that there is no relevant information for this project, or similar statement. Do not delete any whole sections.*

*Abbreviation and document reference tables to be in alphbetical order (abbreviation or doc#).*

*Adjust formatting so tables are generally on 1 page (extra long tables are the exception).*

*Check revisions / titles / doc numbers for all documents referenced.*



Sewage Pumping Station

[Insert SPS site identifier number and street Name designation]

Basis of design

(BoD Template for submersible type Sewage Pumping Stations - maximum pump motor size of 150kW)

DOCUMENT no: [insert doc #]

PROJECT NO: [insert Urban Utilities Project #, or Water Approval Number #]

**Copyright**

This Urban Utilities Sewerage Pumping Station Basis of Design and its contents (including without limitation documents, text, designs and graphics) are subject to copyright under the laws of Australia and, through international treaties, other countries. The copyright materials and other intellectual property rights in this document are owned and retained by Urban Utilities or third parties.

Template Revision Table

|  |  |  |  |  |
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**Document Change History**

Revisions:

Pre IFC Revisions are alpha (A, B, etc).

IFC and post IFC are numeric (1, 2, etc)

Revision Table

|  |  |  |  |  |
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| **Rev** | **Date** | **Document Status** | **Author** | **Review by** |
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|  |  |  |  |  |

Review By

Name & Position in Urban Utilities to whom document was issued for review.

Add Date of any received feedback. Enter “No Comments” if no feedback received.

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Urban Utilities Approved By

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| --- | --- |
| **Name** | [Name] |
| **Position** | [Technical Assurance Lead] |
| **Date** | DD/MM/YYYY |

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# Introduction

## Purpose

*The Basis of Design Document (BoD) for a project is a record of all design criteria, performance requirements, system parameters, design methodologies, decision processes and considerations, as well as reference documents that will be relied upon in the design process.*

*This document is provides a template and guidance for the process of completing an Urban Utilities sewage pumping station basis of design document by highlighting all design requirements that are specific to Urban Utilities’ Sewage Pumping Stations, from the various SEQ WS&S D&C Code documents and other applicable civil, mechanical, electrical and SCADA standards, specifications and reference drawings.*

This Basis of Design [Document Identification Number] provides a single reference to guide the design of the sewage pumping station SPXXX, by identifying performance requirements standards, design criteria, typical drawings and other relevant, project specific details for the proposed new sewage pumping station within the Urban Utilities Service Area.

## Background

*This section is to be completed with sufficient information provided from the Integrated Catchment Plan, Master Plan and Feasibility Report or the Project Planning Report and the Water Approval Notice to provide a basic understanding of the project including the upstream sewer catchment, the downstream receiving sewer system and the reason and timing for the pumping station to be built.*

## Operational Issues/Constraints

*Enter known operational matters that may need to be addressed in the design. Also provide details of operational matters that affect construction sequence, timing, methods, additional work or other measures. Particular consideration should be given to the upstream and downstream sewage transport system.*

## Schedule Considerations

*Provide information about the proposed pumping station construction completion as well as details and timing of interdependent upstream and downstream systems, that is likely to be affected or be dependent on this pumping station project.*

The following ongoing projects shall be considered during the design of this project:

* [project #1/Water Approval Number]
* [project #2/Water Approval Number]
* ….

## Definitions

Table 1‑1 Definitions

| **Word/ Phrase** | **Meaning** |
| --- | --- |
| Project | *[Enter the SPS site ID], [Locality Name] – [URBAN UTILITIES project# or Water Approval Number].* |
| Works | Design and Construct Scope of Works |
| Designer | Person or group responsible for the preparation of the design |
| RPEQ | Registered Professional Engineer Queensland |
| Constructor | An entity contracted by the developer/Urban Utilities to carry out construction of the works. |
| Network Access Permit | The permit that the constructor must obtain from Urban Utilities to carry out works on or near Urban Utilities’ assets |
| Applicant | The applicant for a development proposal |
| Consultant | The consultant engaged by a developer to carry out the design and documentation of the proposed works. |
| Certified Design Package | Drawings, reports, specifications and the like to completely describe the intended works, certified by one or more RPEQ |
| IFA package | Certified Design Package issued for approval |
| IFC package | Certified Design Package issued for construction |
| Developer | The owner of the proposed development |
| Design RPEQ | The RPEQ engaged by the developer to carry out or supervise the design of the works and certify that the design documentation is accurate and complete and meets the standards agreed by Urban Utilities. |
| Construction RPEQ | The RPEQ engaged by the developer to oversee construction of the works to the approved design. |
| Urban Utilities | The company and/or its representatives |
| Q100 Level | The level derived from the relevant local government or state government (or from another agreed entity) flood study for the project site for a 1% AEP flood event. |
| EI&C | Electrical, Instrumentation and Control |

## Abbreviations

The use of abbreviations in this document should align with abbreviations used in the SEQ Code as well as other reference documents. A comprehensive list of abbreviations is found in WSA 02-2014-3.1 (SEQ WS&S D&C Code V2.1-2021). A supplementary list of abbreviations is listed in Table 1‑2 Abbreviations in this document.

Table 1‑2 Abbreviations

| **Abbreviation** | **Description** |
| --- | --- |
| ADWF | Average Dry Weather Flow |
| AEP | Annual Exceedance Probability |
| AHD | Australian Height Datum |
| BOD | Basis of Design |
| BWL | Bottom Water Level |
| EA | Environmental Authority |
| ERA | Environmental Relevant Activity |
| EI&C | Electrical, Instrumentation and Control |
| EP | Equivalent Population or Equivalent Person |
| EROS | Emergency Relief Overflow Structure interchangeable with Emergency Relief Structure (ERS) |
| LCP | Local Control Panel |
| MCPS | Minor Capital Project Submission |
| MH | Maintenance Hole |
| MS | Maintenance Shaft |
| MWL | Mean Water Level |
| P&ID | Process & Instrumentation Diagram |
| PDWF | Peak Dry Weather Flow |
| PFD | Process Flow Diagram |
| PLC | Programmable Logic Controller |
| PQA | Power Quality Analysis |
| PSA | Power Systems Analysis |
| PWWF | Peak Wet Weather Flow |
| RPEQ | Registered Professional Engineer of Queensland |
| SEQ | South East Queensland |
| SSFS | Site-specific functional specification |
| STEP | Site Access, Tenure, Environmental and Planning |
| TWL | Top Water Level |
| TPZ | Tree Protection Zone |
| USO | Uncontrolled Sewage Overflow |
| WS&S D&C Code | Water Supply and Sewerage Design and Construction Code (SEQCode) |

# Documentation

## Project References

The following listed project-specific documents and drawings will be referred to throughout the design process. Design and functional requirement information provided in these documents takes precedence over other standards and codes referred to in this Basis of Design. The project reference documents applicable to this design are provided in Table 2‑1.

*Complete Table 2.1. Insert the Document Identification Code, Title and revision information.*

Table 2‑1 Project References

| **Doc Number** | **Title** | **Revision** |
| --- | --- | --- |
| [doc #] | [Water Approval Decision Notice] | [rev #] |
| [doc #] | [URBAN UTILITIES ICP / Planning Report / Feasibility Report] | [rev #] |
| [doc #] | [MCPS for Sewage Pump Station] | [rev #] |
| [doc #] | [Development Planning Report] | [rev #] |

## Design Standards

The design of the proposed sewage pumping station shall be in accordance with:

* Project references (Table 2‑1);
* Urban Utilities’ Technical Standards refer to section *2.3 Urban Utilities’ Technical Standards*; and
* Urban Utilities’ Sewage Pumping Station drawings (additional to the SEQ Code Standard Drawings), refer Section 2.4 Urban Utilities Standard Drawings
* Urban Utilities’ Standard Drawings, refer Section 2.5 Urban Utilities Typical Drawings.
* SEQ Code;
* WSAA Standards.

Referenced technical documents, drawings and specifications shall be the most current at the time of the design. This Basis of Design document must list the revision and date of all technical documents, drawings and specifications adopted for the design.

*List the revisions and versions of the SEQ Code documents, TMS and typical drawings at the time of the design commencement. Additional notation is to be included in this section which describes any variations or progressions of any document that has subsequently been used in the design through acceptance or direction by Urban Utilities.*

Refer to Appendix 5 for the list of proposed variations from Urban Utilities’ technical standards and specifications. All variations from Urban Utilities’ technical standards and specifications must be agreed by Urban Utilities in writing prior to construction**.**

Urban Utilities’ Technical Standards reference the following general codes to be complied with (current published versions):

* *SEQ Water & Sewerage Design & Construction Code (Amendment to Sewage Pumping Station Code of Australia* (WSA 04));
* *Gravity Sewerage Code of Australia South East Queensland Service Providers Edition (version x.x date)*;
* *Water Supply Code of Australia South East Queensland Service Providers Edition ((version x.x date)*;
* *SEQ Design Criteria (version x.x date)*;
* *SEQ Asset Information Specification(version x.x date) ;*
* *SEQ Accepted Civil Infrastructure Products and Material List (version x.x date) ;*
* *SEQ Accepted Mechanical Products and Material List (version x.x date) ;*

(the above referenced codes are collectively referred to as the **SEQ WS&S D&C Code,** or **SEQ Code** found online at <http://www.seqcode.com.au>).

## Urban Utilities’ Technical Standards

Technical specifications, procedures and templates relevant to the sewage pumping station design are listed in Table 2‑2 (general), Table 2‑3 (civil), Table 2‑4 (mechanical), Table 2‑5 (electrical and instrumentation) and Table 2‑6 (control systems).

*It is the author’s responsibility to check revisions and titles against the* [*Urban Utilities “Development Standards and Guidelines” web page,*](https://urbanutilities.com.au/development/help-and-advice/standards-and-guidelines)  *to ensure currency in referencing.*

*Any project-based variations from Urban Utilities’ technical and design standards that are accepted by Urban Utilities, or additional technical standards directed to be used by Urban Utilities must be captured in Appendix 5*

Table 2‑2 General Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| TMS76 | Supplement to the WSA 201 Manual for Selection and Application of Protective Coatings | [Rev #] |
| PRO662 | Safety in Design Procedure | [Rev #] |
| PRO307 | Engineering Drawing and Document Management Requirements For Capital Project Delivery | [Rev #] |
| TMS1654 | [Project Document Numbering and Naming Requirements](http://tap.urbanutilities.com.au/qpulsedownloads/579064693A554078988715310798065D) | [Rev #] |
| TMS1647 | Plant and Equipment Tag Numbering | [Rev #] |
| TEM618 | Asset Management Equipment Register | [Rev #] |
| TMS176 | Security Design Guidelines | [Rev #] |
| PRO395 | Urban Utilities Addendum to: SEQ Water Supply and Sewerage Design & Construction Code | [Rev #] |

Table 2‑3 Civil Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| TMS1435 | Technical Specification for Design and Construction of Water and Sewerage Main Systems | [Rev #] |
| STD117 | Fall Protection and Safety Requirements for Liquid Retaining Structures - Design Standard Note | [Rev #] |
| STD146 | Air, Dust and Odour Environmental Standard | [Rev #] |
| TMS1582 | Specification for Horizontal Directional Drilling (for rising mains only). | [Rev #] |
| TMS1583 | Micro-tunnelling and Pipejacking Specification | [Rev #] |
| TMS1731 | Civil and Structural General Specification | [Rev #] |
| TEM715 | Template for Geotechnical Investigation Interpretive Report | [Rev #] |

Table 2‑4 Mechanical Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| TMS1639 | Standard Technical Specification – General Mechanical Works | [Rev #] |
| TMS1636 | Asset Specification for Hypochlorite and Monochloramine Chemical Dosing Units. | [Rev #] |

Table 2‑5 Electrical and Instrumentation Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| TMS60 | Low Voltage Switchboard and Enclosures | [Rev #] |
| TEM336 | Power System Analysis Guidelines | [Rev #] |
| TMS62 | Preferred Equipment List Electrical and Instrumentation and Control. | [Rev #] |
| TMS1732 | Electrical and Instrumentation General Specification | [Rev #] |

Table 2‑6 Control Systems Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| PRO396 | Control Systems Change Management Procedure | [Rev #] |
| TEM515 | Functional Specification Template for Non-Complex Sites - per PLC/RTU | [Rev #] |
| TMS1650 | SSM084 Standard Sewage Pumping Station Functional Specification | [Rev #] |
| TMS1151 | Preferred Equipment List Control Systems | [Rev #] |
| TMS1733 | Control Systems General Specification | [Rev #] |

Table 2‑7 Environmental Standards

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| [FOR325](https://tap.urbanutilities.com.au/qpulsedownloads/BCB1048B1FCC45E79B5AD265E6A9DF50) | Preliminary STEP Assessment | [Rev #] |
| [FOR608](https://tap.urbanutilities.com.au/qpulsedownloads/E622B4F658664EEBAA5527DB4FC44434) | STEP Assessment Spreadsheet | [Rev #] |

## Urban Utilities’ Standard Drawings

The standard drawings listed in Table 2‑8 are to be utilised in the design documentation. Where relevant, these drawings are to be referenced in the IFA package and included with the IFC package.

Table 2‑8 Standard Drawings

| **Drawing Number** | **Title** | **Rev #** |
| --- | --- | --- |
| 486/1/25-0004-001 | Chain Wire Security Fencing and Signage Notes | [Rev #] |
| 486/1/25-0004-002 | Typical Fence and Single Person Access Gate Details | [Rev #] |
| 486/1/25-0004-003 | Vehicle Access Gate and Corner Post Detail | [Rev #] |
| 486/5/25-0003-342 | VALVE PIT PRESSURE SENSOR INSTALLATION AND DETAILS | [Rev #] |
| 486/5/25-0003-312 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN100 AND DN150 HOSE CONNECTION BEND ASSEMBLIES | [Rev #] |
| 486/5/25-0003-313 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN100 WALL PIPE BRACKET AND HANGER DETAILS | [Rev #] |
| 486/5/25-0003-314 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN150 WALL PIPE BRACKET AND HANGER DETAILS | [Rev #] |
| 486/5/25-0003-315 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN100 HOSE CONNECTION BEND QUICK COUPLING DETAILS | [Rev #] |
| 486/5/25-0003-316 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN150 HOSE CONNECTION BEND QUICK COUPLING DETAILS | [Rev #] |
| 486/5/25-0003-317 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN100 HOSE CONNECTION BEND DETAILS | [Rev #] |
| 486/5/25-0003-318 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN150 HOSE CONNECTION BEND DETAILS | [Rev #] |
| 486/5/25-0003-319 | CHAIN SUSPENDED SUBMERSIBLE PUMP DN100 TO DN150 ENLARGING HOSE CONNECTION BEND DETAILS | [Rev #] |
| 486/4/25-0005-002 | GENERAL ARRANGEMENT FLOWMETER FACILITY | [Rev #] |

## Urban Utilities Typical Drawings

Urban Utilities typical drawings for sewage pumping station electrical, instrumentation and controls are attached at Appendix 2. These drawings are provided for design guidance and are suitable as a template. These drawings must be developed into project-specific drawings with associated project-specific drawing numbers.

## Preferred Equipment

*Any project-based variations from preferred equipment that are accepted by Urban Utilities or additional product direction by Urban Utilities must be captured in Appendix 5*

Preferred electrical, instrumentation and control system equipment lists are provided in Table 2‑9. Proposed variations to these lists are listed in Appendix 5.

Refer to <http://www.seqcode.com.au/products/> for Preferred Mechanical and Civil Products (IPAM lists).

Table 2‑9 Preferred Equipment Lists

| **Doc Number** | **Title** | **Rev #** |
| --- | --- | --- |
| TMS62 | Preferred Equipment List Electrical and Instrumentation | [Rev #] |
| TMS1151 | Preferred Equipment List – Control Systems | [Rev #] |

## Project Drawing List

The project drawing list for the proposed sewage pumping station is attached at Appendix 1 – Project Drawing List.

*Applicant to complete the drawing list Appendix including references for drawings as applicable.*

*Numbering in accordance with* *TMS1654* [*Project Document Numbering and Naming Requirements*](http://tap.urbanutilities.com.au/qpulsedownloads/579064693A554078988715310798065D)*.*

*Document request through FOR1063* [*Project Document Number Request Form*](http://tap.urbanutilities.com.au/qpulsedownloads/DAE9A40D684049CB9CA137FE0897E1C7)*.*

## Variations

All project-based variations from Urban Utilities’ Design Standards that are accepted by Urban Utilities, or additional technical standards directed to be used by Urban Utilities are captured in Appendix 5

# Site Conditions

## Site Location

The [Site name (Site ID)] is located in [insert details of where the SPS is located.]

*Insert an aerial photo of the locality map* *to scale per the* SEQ Code Asset Information Specification *showing existing RP boundaries with a point marked to indicate location options for the sewage pumping station and a line showng the proposed rising main route, as well as other proposed features such as emergency relief overflow structures, grit chambers or emergency storage structures. To provide sufficient clarity, it may be necessary to create a section break in this document and insert the Figure on an A3 Page .*

*The geometry of the property allocated for the sewage pumping station must be adequate to contain the infrastructure while achieving the vehicle access and manouevring requirements detailed in section 4.10.3.*

Figure 3‑1: Site Locality

## Climatic Conditions

The climatic conditions for the site are provided in Table 3‑1.

Table 3‑1 Site Climatic Conditions

| **Parameter** | **Value** |
| --- | --- |
| Site Exterior Environment | Select one of Coastal/Non-Coastal/Rural |
| Ambient dry bulb air Temperature Range (for Design): | -5oC to 45°C |
| Rainfall for drainage design (5% AEP storm flows (Level IV QUDM\*)): | 324 mm/day |
| Average ambient Relative humidity: | 65% @ 28oC |
| Ambient Relative Humidity Range (for Design): | 10% at 35oC to 100% (Condensing) |
| Solar Radiation Black Bulb Temp | 85°C |

## \*Queensland Urban Drainage Manual

## Solar Radiation

Above-ground equipment and pipework exposed to the sun and that contains stagnant (non-flowing) fluids shall be designed to accommodate heating of exposed surfaces.

Where surface temperatures may exceed 60 °C, the Designer shall include for thermal insulation to limit temperature rise to below 60oC or guarding to prevent personnel from being able to touch hot surfaces.

# Basis of Design

This section describes site-specific design and layout requirements of site areas associated with the ***[Site Name (Site ID) Project Title], [Project Number (URBAN UTILITIES Capital Project), or Water Approval Number #]***.

## Design Considerations

It is proposed to design and construct:

* a new sewage pumping station [SPS##} at, [Street Address], [Locality] in accordance with Water Approval Notice number ##; and
* approximately ####metres of DN### sewer rising main.

### Design for Workplace Health and Safety

The safety of the public and everyone who may interact or be impacted during construction, operation, maintenance or future foreseeable modification or demolition of the works shall be a fundamental consideration in the facility layout and design. Installations shall be designed such that all operation and maintenance can be carried out safely.

It shall be the responsibility of all parties to fully comply with all related legislative requirements including the Queensland *Work Health and Safety Act 2011*, *Work Health and Safety Regulation* 2011 and associated Codes of Practice.

The design shall be subject to Safety in Design Reviews (SID) during detailed design phase with participation by Urban Utilities and related parties.

The Safety in Design process applied shall be in accordance with Urban Utilities specification PRO662 *Safety in Design Procedure*.

### Design Life

The equipment shall be designed for minimum design life durations as stated in Table 4‑1. The equipment shall also be suitable for normal continuous operation with only minimal routine maintenance as specified by the component manufacturer.

Table 4‑1 Design Life

| **Component** | **Min. Design Life (Yr)** | **Reference** |
| --- | --- | --- |
| Civil Structures (including sewers, MH, Wet well, emergency storage chamber, valve chambers, plinths, pedestals, etc.) | 100 | SEQ Sewage Pumping Station Code |
| Civil Pipe Works (including gravity sewers, rising mains, overflow pipes) | 100 | SEQ Sewage Pumping Station Code |
| Electrical Equipment and Related Assets | 25 | SEQ Sewage Pumping Station Code |
| Instrumentation and Control Equipment Including Software | 15 | SEQ Sewage Pumping Station Code |
| Mechanical Equipment and Related Assets | 25 | SEQ Sewage Pumping Station Code |
| Structural Steel | 50 | TMS1731 |
| FRP/GRP/PE/PVC Process Tanks | 25 | TMS1639 |
| Ducting and Drainage Pipework | 50 | SEQ Sewage Pumping Station Code |
| Vehicular and pedestrian access pavements  (Reinforced Concrete) | 100 | SEQ Sewage Pumping Station Code |
| Protective coating on metalwork | 25 |  |
| Protective coating on concrete | 100 | SEQ Sewage Pumping Station Code Standard Drawings SEQ-SPS-1301-3 and SEQ-SPS-1301-4 |

### Staging of Construction Works

The design shall incorporate all necessary features and provisions for the staging of the Works, including temporary works.

The design is undertaken on the basis that:

* The upstream and downstream sewer systems that the new sewage pumping station and rising main is connecting into may be live during the construction and commissioning of the new works; and
* Necessary works on or near existing Urban Utilities’ assets (including cut-ins) will be achieved with minimal disruption to the operation of the network.

Works on or near Urban Utilities’ sewerage and water supply assets require a Network Access Permit, issued by Urban Utilities. The Construction RPEQ must make the Constructor aware of the requirement to request and obtain a Network Access Permit, by written instructions issued to the Constructor. The Design RPEQ must provide notes on the IFA drawings to address this requirement.

## Design Levels

Design level information and required site design levels for the site are provided in Table 4‑2.

Table 4‑2 Site Design Levels

| **Item Description** | **Value (m AHD)** |
| --- | --- |
| Existing Site Grade | R.L [Value] |
| Site 1%AEP Level | R.L. [Value] |
| FSL of Wet Well Slab | 1%AEP +300mm (minimum) |
| FSL of Valve Pit Cover | As per Wet Well |
| FSL of Access Road Pavement | 1%AEP (minimum) |
| FSL of Manhole Covers | 1%AEP (minimum) |
| FSL of Valve Surrounds | 1% AEP (minimum) |
| FSL of Flowmeter Pit Covers | 1%AEP (minimum) |
| FSL of other Appurtenances | 1%AEP (minimum) |
| Invert Level of inlet sewer at Wet Well | R.L. [Value] |
| Invert Level of Wet Well | R.L. [Value] |
| Top Water Level | R.L. [Value] |
| Bottom Water Level | R.L. [Value] |
| Invert Level of Sewer Overflow Diversion | R.L. [Value] |
| Valve Pit base Invert Level | R.L. [Value] |
| Invert level of sewer rising main at valve pit | R.L. [Value] |
| Grit Collector Manhole Invert Level | R.L. [Value] |

## System Design

The sewage pumping system design shall be carried out in accordance with the SEQ Sewage Pumping Station Code *insert current version).*

*Make reference to information provided in the project reference documents listed in Section 2.1* Project References*, Table 2‑1* Project References*, of this document . Catchment growth and upstream and downstream infrastructure investment milestones that affect the required flow capacities at each of the identified stages, should also be outlined in this section. If available, Input and Output data sheets from hydraulic system calculations shall be provided in the Appendix.*

*Sewage pumping system design criteria are taken from the SEQ Design Criteria. When using this template, complete Table 4.3 System Design Criteria.*

Table 4‑3 System Design Criteria

| **Design Consideration** | **Criteria** | **Reference/Advice** |
| --- | --- | --- |
| Design Flow Capacities | Refer to Section 4.3.1 Flow/Dynamic Head, of this Document. | Based on SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria or Water Approval Conditions. |
| Operating storage (m3) | |  | | --- | | (0.9 x Single pump capacity L/s)/ N  N = 12 starts per hr for motors less than 50kW.  N = 5 starts per hr for motors greater than 50kW. | | Based on SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria or Water Approval Condition. |
| Pump Configuration | Duty/Standby, or Duty/Standby with VSD | Refer to 4.4 Other System Features and Functionality Options. Also refer to SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria and SEQ Sewage Pumping Station Code Part 1, Sections 2.7 and 6.4 or Water Approval Conditions. |
| Wet Well Sizing | Well Diameter/Volume between cut-in and cut-out set to limit pump starts. | Ultimate Capacity, Ultimate pump. Based on SEQ Sewage Pumping Station Code, Part 1, Section 5.4.2. Or as per Water Approval Conditions. SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria |
| Flowmeter | Required/Not required  Standard Pumping Station, or  Small Pumping Station | SEQ Sewage Pumping Station Code Standard Drawing SEQ-SPS-1102-5. For ultimate capacities <30L/s SEQ Sewage Pumping Station Code Standard Drawing SEQ-SPS-1102-06 may be used. |
| Emergency Storage | 3 hrs Ultimate PDWF (New) /  3 hrs Ultimate ADWF (Existing) | SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria. |
| Pump Control Levels | As per Entries in Table 4‑6 SPS Features and Functionality | SEQ Sewage Pumping Station Code Standard Drawings SEQ-SPS-1102-5 and SEQ-SPS-1102-6. SEQ Sewage Pumping Station Code , Part 1 Section 5.4. SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria. |
| System Retention Time | System retention time must be considered when selecting the rising main size and material, along with other design criteria. Generally, 2 hours is considered to be a maximum system retention time calculated using ADWF at the early stages of Development. The designer should consult with Urban Utilities, if Detention times of greater than 2 hours are likely.  Where the calculated detention time is more than two hours, measures to mitigate septicity and odour arising from excessive detention time shall be employed | SEQ Sewage Pumping Station Code Part 1, Section 2.8.2.  Clause 2.7 of the SEQCode requires that ‘the system shall operate effectively when 20% of the design properties are connected’  Other applicable requirements in the SEQ Code and WSAA Codes that apply for System Hydraulic Retention include:   1. Clause 2.5 Due Diligence Requirements; 2. Clause 2.8 Septicity Control; 3. Clause 2.9 Odour Management; 4. The latest version of WSA 04-2022 V3.2 Clause 6.4.5 Detention Time (not currently part of the SEQCode as the SEQ Sewage Pumping Station Code has not been updated to the current version of WSA04). 5. The latest version of WSA 04-2022 V3.2 Clause 11.10 Odour and Septicity Control (not currently part of the SEQCode as the SEQ Sewage Pumping Station Code has not been updated to the current version of WSA04). |
| Rising Main | Refer to Table 4‑5 Rising Main Design Details | SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria, D7. |

### Flow/Dynamic Head Details

*If the proposed pumping station is required to service sewage catchment growth over a number of years or over a significant flow range, the hydraulic design shall account for a staged servicing strategy. Refer to SEQCode WSA04-2005 Part 1, Section 2.7. The details and required flow and pump duty for the servicing strategy milestones shall be provided in Table 4‑4 Design Flow Details below. Also refer to Table 4‑3 System Design Criteria.*

The design flow values for the sewage pumping station are provided in Table 4‑4.

Table 4‑4 Design Flow Details

|  | **Stage 1 (Year)** | | **Stage 2(Year)** | | **Ultimate** | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | |  | |
| Catchment EP | [Value] | | [Value] | | [Value] | |
| ADWF | [Value]L/s | [Value]m | [Value]L/s | [Value]m | [Value]L/s | [Value]m |
| PDWF | [Value]L/s | [Value]m | [Value]L/s | [Value]m | [Value]L/s | [Value]m |
| PWWF | [Value]L/s | [Value]m | [Value]L/s | [Value]m | [Value]L/s | [Value]m |

The pumping station wet well and other civil structures shall be designed to service the ultimate catchment flow of [Value]. *It may not be possible to confirm a final selection of rising main details and determine the final confirmed value for dynamic head at the time of completing the first draft of this document. In this case either enter a value based on a nominal pipe size estimate, based on a velocity of 1.0-1.5 m/s or mark these fields in the table as, “To be confirmed”, (TBC).*

### Pump Selection

*For each pump duty range, the designer shall carry out a pump selection from at least 3 reputable pump suppliers from the* [*SEQ Water Supply and Sewerage Design and Construction Code, Accepted Products and Materials for Mechanical Installations lists*](http://static1.1.sqspcdn.com/static/f/1424737/28296097/1588914777853/2020-05-08-+SEQ+Accepted+Mechanical+Equipment+List.pdf?token=dtMPq8neIprYIMIrALMlIrYaQpM%3D)*.*

*A selection table shall be completed and supplied in Appendix 3 for the project specific derivative of this report. The selection table shall show and discuss, but may not be limited to the following criteria:*

* *Purchase and supply cost of pumps and accessory items*
* *Pump efficiency*
* *Energy Cost calculated over a 10-year period* *for the optimal size of rising main. Provide details of assumed discount factor, electricity tariff and electricity cost escalation.*
* *Any relevant build material differentiator that would affect the life of the pump or its parts*
* *Any relevant performance differentiator such as resistance to clogging and ease of maintenance including to replace spare parts, suitability for impellor upgrades and suitability of the pump curve to accommodate variability of the duty point within its recommended operating range including for staged development.*
* *Availability of; and lead times for the supply of spare parts*
* *Availability of a local servicing organisation*

*Copies of the completed selection criteria evaluation table and the manufacturer’s product information indicating specific material build and feature options for the proposed pumps that are considered as part of the pump selection process in Appendix. 3*

*Refer also to guidance in Table 4‑6 SPS Features and Functionality*

*Include a summary of the selected pump units here with supporting details in Appendix 3.*

Pump selection details and curves are attached at Appendix 3.

### Rising Main Details

*The IFA package must justify the proposed size of rising main, which must be optimised using an economic analysis over a 20-year period that includes the capital, operating and maintenance cost of the rising main, pumps and EI&C equipment. This must be balanced against the sewage detention time, minimum and maximum flow velocity and any required provisions to mitigate transients, adopting* *SEQ Code criteria. Staging over the life of the development using dual rising mains may be required to achieve all these criteria.*

Key design parameters for the rising main are provided in Table 4‑5 Rising Main Design Details below.

The minimum pipe and fittings pressure class for rising mains shall be PN16.

Table 4‑5 Rising Main Design Details

| **Item Description** | **Value** | **Reference/Advice** |
| --- | --- | --- |
| Open pipe level or free Surface Water Level at discharge manhole. (m AHD) | [Value] | Project drawings. |
| Mean Water Level in Wet Well (m AHD) | [Value] | Project drawings. |
| Design Static Lift (m) | [Value] | Project drawings |
| Pipe Material | [Value] | SEQ Accepted Civil Infrastructure Product and Materials List (IPAM), SEQ Sewage Pumping Station Code, Part 1, Section 10. |
| Pipe Internal Diameter (ID) (mm) | [Value] | - |
| Maximum Design Pressure (kPa) | [Value] | WSA04 Part 1, Section 10.4 |
| Preferred Velocity (m/s) | 1.0-1.5 | SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria |
| Minimum Velocity (m/s) | 0.75 | SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria |
| Maximum Velocity (m/s) | 3.0 | SEQ Design Criteria, Part C, Table 10 – Sewage Network Design Criteria |

*Add any supporting description and design basis information as required. Include any air and scour valve requirements, grade details, cover requirements, construction methodology etc.*

*Include details of the discharge structure requirements. Include details of any rising main surge protection required.*

*Include details of dual rising main arrangements (if required) with auto or manual change-over valves to allow for future capacity increase.*

## Other System Features and Functionality Options

*Provide details of other features that are required for this sewage pumping station project, including functionality requirements. Complete the table below.*

Specific features and functionality requirements for the sewage pumping station are listed in Table 4‑6.

Table 4‑6 SPS Features and Functionality

| **Item** | **Required** | **Notes** |
| --- | --- | --- |
| Pump start method | (DOL / SS / VSD) |  |
| 3rd pump | Yes/no | Describe duty/standby arrangement for pumps |
| Pump Motor Connection | (Direct / De-contactor / Field Connection) |  |
| Emergency Relief Overflow Structure | Yes | Env. Release/ adjacent system / screening requirements |
| Separate emergency storage tank required | Yes/no | Size |
| Emergency storage dewatering pump & level sensor | Yes/no | Size |
| Valve pit sump pump and level sensor | Yes/no | Size |
| Permanent generator with ATS, or, concrete slab for temporary standby generator | Yes/no | Type |
| Chemical dosing | Yes/no | Type |
| Odour Control | Yes/no | Type |
| SPS Cathodic protection | Yes/no |  |
| Wet well washer | No | Not required |
| Direct connected metering | No |  |
| Pumps electrical interlock | Yes/no |  |
| Telemetry radio | Yes/no | Type |
| Back communication | Yes/no | Type |
| Delivery flowmeter | Yes/no | Type |
| Reflux valve limit switch | Yes/no |  |
| U/S MH surcharge imminent sensor | Yes/no |  |
| Wet well secondary level sensor | Yes/no |  |
| Pump moisture in oil sensor and fault relay | Yes/no |  |
| Pump moisture in stator sensor and fault relay | Yes/no |  |
| Motor thermistors | Yes/no |  |
| Power meter | Yes/no |  |

## Mechanical Design

### Applicable Codes and Standards

The Urban Utilities specifications listed in Section 2.3 will be observed with respect to the mechanical design works.

The mechanical equipment and materials shall comply with the applicable Urban Utilities Technical Standards and applicable Australian Standards.

Technical Standard TMS1639 is the “umbrella” standard setting the requirements for mechanical systems.

### Noise

All items that can potentially generate noise above allowable limits shall be attenuated as necessary to maintain plant noise levels to comply with TMS1639 and Environmental Protection (Noise) Policy 2019.

### Ventilation

The wet well covers must achieve a gas tight seal when closed in accordance with requirements detailed on SEQ-SPS-1304-10. However, the type and size of covers shall be selected so that they are suitable for safe manual handling or provision made for mechanical handling.

All cable conduits that intersect with the wet well must be sealed to prevent gas migration from the wet well head space.

The head space of the wet well and the upstream grit collector manhole shall be cross connected to the common pumping station vent pole as shown on SEQ-SPS-1102-5 or SEQ-SPS-1102-6. Typical vent tube arrangements are shown on SEQ-SPS-1301-02. Typical vent pole details are shown on SEQ-SPS-1405-1.

Odour control measures shall be provided in accordance with the requirements of the odour assessment, including at the wet-well, discharge maintenance hole and any gas release valves on the rising main.

### Gravity Drain from Pits

The valve pit shall have a 450x450x300 deep sump with a DN100 gravity drain from the invert of the sump to the wet well. The drain from the valve pit must be sealed with a silicone Tideflex NRV, or equal product, at the valve pit drain sump and with a PVC frog flap NRV at the wet well end. This is to prevent gas migration from the wet well head space into the valve pit chamber and to prevent snakes, vermin, frogs or insects from entering the drainpipe from within the wet well. Note that this requirement replaces the requirement for a small sump pump, which is indicated on SEQ-SPS-SEQ-1301-2 and SPS-SEQ-1301-3. The flowmeter pit shall be free gravity drained to the valve pit.

### Maintenance Access

The key design consideration for the Designer with respect to provision for access to mechanical equipment relates to the ability for Urban Utilities’ pumping station maintainers to position their service vehicles so that they can use the hydraulic jib crane that is mounted on the service vehicle. So far as is reasonably practicable, the pumping station design must minimise the distance between where the service vehicle stands and the centre of gravity of the furthest pump. This consideration must also be given to any other item requiring mechanical lifting aids, within the total design of the pumping station complex.

Requirements for the design and construction of the sewage pumping station access pavement is detailed in Section *4.10.3 Access Roads* of this document.

### Flowmeter

If required, the flowmeter shall be installed in a pit, as indicated in drawing 486/4/25-0005-002 and drawing SEQ-SPS-1301-2. Refer to Table 4‑7 *Flowmeter Requirements* and follow all manufacturer’s recommendations and guidance.

Table 4‑7 Flowmeter Requirements

| **Parameter** | **Value** |
| --- | --- |
| Flowmeter Type | Electro-magnetic |
| Maximum measurement error | +/- 0.5% , Operating range cut-off at 2mm/s |
| Enclosure Rating of Flow Tube | AS1939 – IP68 |
| Measuring tube material | SS 304L |
| Measuring tube flange material | Carbon Steel, Flanges ASTM A105 |
| Measuring tube liner | Natural Rubber. |
| Sensor Housing | Carbon steel, fully welded housing. |
| Sensor Electrode Material | C22 Hastelloy |
| Ground Disks | C22 Hastelloy |
| External Coating Flow Tube | AS2312.1 - EVH2 or ISO12944-5 A1.26 Very high build Epoxy. |
| Product Selection and Installation references | SEQ-SPS-1302-2, 486/4/25-0005-002, TMS60 and TMS62. |
| Size | To match rising main nominal bore diameter. |
| Voltage | 24V DC |
| Physical installation option (Remote) | Transmitter/controller within switchboard cables shall be connected, tested and potted at the flow tube by the manufacturer, prior to shipping. |
| Connection | Flange AS4087 PN16 |

## Facility Piping and Jointing Requirements

List any specific project requirements.

Above ground and buried piping shall comply with the SEQCode and TMS1435.

Generally, flanges shall comply with AS4087, using grade 316 stainless steel bolts and nuts with washers. Studs bolts and tapped flanges shall not be permitted. Backing flanges for any PE Piping shall be 316SS. Any buried flanges must be fully protected using a conforming, barrier system such as Denso Petrolatum System or similar. FBE, internally coated pipe spools, bends and reducers are not accepted for sewage pumping station pipework.

## Submersible Pumps

Submersible Sewage Pumps shall conform with *WSA 101-2008 Industry Standard for Submersible Pumps for Sewage Pumping Stations,* except for the following qualifications set out in *Table 4‑8: WSA 101 Qualification Items* below.

Table 4‑8: WSA 101 Qualification Items

| **WSA101-2008 Clause** | **Value** |
| --- | --- |
| Table 2.1 | The impellor must be high Chromium, Abrasion resistant white iron, or other hard-wearing steel alloy to produce equivalent hard-wearing performance. Grey cast iron AS1830 250 Grade impellors are not accepted. |
| 3.1 (d) | Pumps must be capable of continuous operation with the motor housing not submerged. |
| 3.7.6 | All pump units must incorporate a leakage detection device such that leakage past the mechanical seals is detected and alarmed. |
| 3.7.7.1 | The maximum number of starts per hour for projects where an existing site is being upgraded and where the pump is operated through a VSD may be able to be relaxed from requirements specified in Table 3.3. |
| 3.7.7.1 (a) | Two-pole motors may be approved. Consult with Urban Utilities if the specific pump duty suits a two-pole pump selection better. |
| 3.7.7.3 | Motor cooling by passing part of the pumped fluid through a water jacketed arrangement within the motor housing as per option (c) are not accepted because of the increased risk of blockage or corrosion of cooling liquid galleries. Internal, closed loop liquid cooling as per option (b) shall be required. |

## Electrical and Instrumentation Design

### Applicable Codes and Standards

The Urban Utilities specifications listed in Section 2.3 will be observed with respect to the electrical and instrumentation design works.

The electrical and instrumentation equipment and materials shall comply with the relevant Urban Utilities Technical Standards and relevant Australian Standards.

### Electrical Specific Design Deliverables

Sewage pumping stations shall be designed in accordance with requirements detailed and referenced in Table 4‑9: Electrical Design Deliverables. The electrical switchboard design for the proposed new sewage pumping station shall generally follow the standard switchboard design and include necessary changes to match the specific supply, load and site requirements for this project.

Table 4‑9: Electrical Design Deliverables

| **Doc Number** | **Title** | **Revision** |
| --- | --- | --- |
| [doc #] | Power Systems Analysis Report | [rev #] |
| [doc #] | Lightning Protection Design Report | [rev #] |
|  |  |  |
|  |  |  |

### Power System Analysis (PSA)

A PSA shall be undertaken for the proposed new sewage pumping station in accordance with TEM336.The PSA shall be delivered as a single consolidated report. The PSA shall include the following elements: Load flow, pump starting analysis, fault current calculation, protection coordination, arc flash analysis, LV cable calculations and harmonic analysis.

Include *summary of key details and requirements.*

### Electrical Equipment

*Update section as required. If not applicable, remove wording and indicate not applicable.*

New electrical equipment shall be preferentially selected from TMS62. Datasheets for new electrical equipment to be developed during detailed design.

The installation of equipment and cabling shall comply with TMS1200.

### Lightning Protection

*Update section as required. If not applicable, remove wording and indicate not applicable.*

All platform structures and equipment installed shall be protected against damage from lightning strikes. The design shall minimise the risk to personnel and the electrical system, under lightning strike conditions. Lightning protection for the platforms shall designed and installed in full compliance with TMS1732.

### Uninterruptable Power Supply (UPS)

*Update section as required. If not applicable, remove wording and indicate not applicable.*

## Control Systems

### Applicable Codes and Standards

The Urban Utilities specifications listed in Section 2.3 will be observed with respect to the control system design works.

The control system equipment and materials shall comply with the relevant Urban Utilities Technical Standards and relevant Australian Standards.

### Control System Design

*Update section as required. Reference functional specification.*

Functional specification shall comply with TEM515 and TMS1733*.*

New control system hardware shall be selected from TMS62 Preferred Equipment List Electrical and Instrumentation and TMS1151 Preferred Equipment List Control Systems.

## Civil Design

### Applicable Codes and Standards

The Urban Utilities specifications listed in Section 2.3 will be observed with respect to the civil design works.

### Survey Data

All levels used on the project shall be to the Australian Height Datum (AHD).

### Access Roads

All sewage pumping stations must have all weather paved surfaces to support maintenance vehicle access, including provision for safe manoeuvring of the vehicle to get on and off the road in accordance with the requirements of the Road Authority.

The vehicular entry gate to the fenced site must be recessed and configured to allow the design maintenance vehicle to be located completely within the front property boundary of the site. The sewage pumping station access road shall conform to Section 15 of TMS 1731 Civil and Structural General Specification except as follows:

* *Comply with the requirements of Drawing SEQ-SPS-1102-1 except as specified*
* *Vehicle pavement width 4 metres minimum (6.2m width minimum for two-way traffic).*
* *Pavement to be reinforced concrete*
* *The design vehicle is an HRV as defined in* AS2890.2:2018 Parking Facilities Part 2: Off-street commercial vehicle facilities
* *The design vehicle must be able to:*
  + *always enter and leave the site in a forward direction while being located on the reinforced concrete pavement at all times; and*
  + *manoeuvre within the site to access the wet well as specified while located on the reinforced concrete pavement at all times*
* *Driveways and access from the public road must also meet requirements of the road authority.*

*The design package shall include swept path diagrams and the design criteria adopted for obtaining these diagrams as well as the Vehicle Turning Path Drawings to show that the pavement geometry meets access and manoeuvring requirements.*

*The size of the site provided for the sewage pumping station must be adequate to achieve the access road criteria herein. Vertical grades within the site must be suitable for all operational requirements including design vehicle manoeuvring, and compliant with AS2890.2.*

### Stormwater Drainage

*Complete section as required.*

Appropriate levels shall be designed to ensure no backflows from stormwater into wastewater infrastructure.

Design floods shall be estimated using the methodologies described in the latest current version of the *Queensland Urban Drainage Manual*  (QUDM). An Average Exceedance Probability (AEP) interval of 5% shall be applied for general site drainage and access roads.

Building downpipes shall be directed to ground at an appropriate location such as the road kerb or alternatively is shall be discharged to the existing piped stormwater network.

Where stormwater flows are concentrated, they will be directed through natural flow paths towards, and able to connect to existing stormwater drainage systems.

*Adopt recommendations in QUDM for the design of stormwater systems. Where criteria are elective, specify the proposed values herein.*

### Fencing & Guarding

*Update section as required. If not applicable, remove wording and indicate not applicable.*

Site fencing shall be to the following minimum standard:

* 1.8m high chain link fence;
* three strands of barbed wire;
* fence post extension cranked 45O outwards from secure area, except gate posts.

Adopt standard Urban Utilities drawings for fencing as detailed in Section 2.4.

Refer to *Section 3.1 of TMS176 Security Design Guidelines which forms part of the technical standards.*

# APPENDICES

## Appendix 1 – Project Drawing List

Table 5‑1 Project Drawing List

| **Drawing Number** | **Title** | **Reference/ Guidance** |
| --- | --- | --- |
| [value] | COVER SHEET LOCALITY PLAN |  |
| [value] | DRAWING LIST |  |
| [value] | CONSTRUCTION NOTES |  |
| [value] | SITE LAYOUT | SEQ Code Standard Drawing SEQ-SPS-1102-4 |
| [value] | LEVEL AND CAPACITIES INTERACTION DIAGRAM | SEQ Code Standard Drawing SEQ-SPS-1102-5 or 6 |
| [value] | PROCESS AND INSTRUMENTATION DIAGRAM | SEQ Code Standard Drawing SEQ-SPS-1101-2 |
| [value] | PUMP AND SYSTEM RESISTANCE CURVES | SEQ Code Standard Drawing SEQ-SPS-1101-3 |
| [value] | SITE SETTING OUT DETAILS |  |
| [value] | SEWER RISING MAIN PLAN AND LONGITUDINAL SECTIONS | SEQ Code Standard Drawing SEQ-SPS-1100-2 |
| [value] | GENERAL ARRANGEMENT PLAN AT TOP LEVEL | SEQ Code Standard Drawing SEQ-SPS-1301-1 |
| [value] | GENERAL ARRANGEMENT PLAN AT HEADER PIPE LEVEL | SEQ Code Standard Drawing SEQ-SPS-1301-2 |
| [value] | GENERAL ARRANGEMENT PLAN AT OTHER RL'S |  |
| [value] | PUMP WELL SECTIONAL ELEVATION | SEQ Code Standard Drawings SEQ-SPS-1301-3 and 4 |
| [value] | SCHEDULES, SECTIONS AND DETAILS |  |
| [value] | EMERGENCY STORAGE AND VENTILATION DETAILS | SEQ Code Standard Drawings SEQ-SPS-1402-1 and 1405-2 |
| [value] | ACCESS ROAD DETAILS AND SECTIONS |  |
| [value] | CONCRETE AND REINFORCEMENT DETAILS |  |
| [value] | SWITCHBOARD SLAB AND CONDUIT DETAILS |  |
| [value] | DISCHARGE MAINTENANCE HOLE DETAILS | SEQ Code Standard Drawing SEQ-SPS-1406-2 or 3 or 4 |
| [value] | DRAWING INDEX | SP###-1000\_EE-DRG-0001 |
| [value] | SINGLE LINE DIAGRAM -400VAC & 230VAC | SP###-1000\_EE-DRG-0002 |
| [value] | POWER DISTRIBUTION SCHEMATIC DIAGRAM -400VAC & 230VAC | SP###-1000\_EE-DRG-0003 |
| [value] | SCHEMATIC DIAGRAM – SUBMERSIBLE PUMP No1 | SP###-1000\_EE-DRG-0004 |
| [value] | SCHEMATIC DIAGRAM – SUBMERSIBLE PUMP No2 | SP###-1000\_EE-DRG-0005 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0006 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0007 |
| [value] | SCHEMATIC DIAGRAM – MANUAL TRANSFER SWITCH | SP###-1000\_EE-DRG-0008 |
| [value] | SCHEMATIC DIAGRAM- COMMON CONTROLS | SP###-1000\_EE-DRG-0009 |
| [value] | SCHEMATIC DIAGRAM – COMMON RTU I/O | SP###-1000\_EE-DRG-0010 |
| [value] | SCHEMATIC DIAGRMA – 24VDC DISTRIBUTION & RTU LAYOUT | SP###-1000\_EE-DRG-0011 |
| [value] | TERMINATION DIAGRAM - RTU DIGITAL INPUTS \_ SHEET 1 OF 2 | SP###-1000\_EE-DRG-0012 |
| [value] | TERMINATION DIAGRAM – RTU DIGITAL INPUTS 2 OF 2 | SP###-1000\_EE-DRG-0013 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0014 |
| [value] | TERMINATION DIAGRAM – RTU DIGITAL OUTPUTS – SHEET 1 OF 2 | SP###-1000\_EE-DRG-0015 |
| [value] | TERMINATION DIAGRAM – RTU DIGITAL OUTPUTS – 2 OF 2 | SP###-1000\_EE-DRG-0016 |
| [value] | TERMINATION DIAGRAM – RTU ANALOGUE INPUTS | SP###-1000\_EE-DRG-0017 |
| [value] | TERMINATION DIAGRAM – RTU ANALOGUE OUTPUTS | SP###-1000\_EE-DRG-0018 |
| [value] | TERMINATION DIAGRAM – COMMON CONTROLS | SP###-1000\_EE-DRG-0019 |
| [value] | EQUIPMENT SCHEDULE | SP###-1000\_EE-DRG-0020 |
| [value] | CABLE SCHEDULE | SP###-1000\_EE-DRG-0021 |
| [value] | LABEL SCHEDULE | SP###-1000\_EE-DRG-0022 |
| [value] | CONSTRUCTION DETAILS – SHEET 1 OF 3 | SP###-1000\_EE-DRG-0023 |
| [value] | CONSTRUCTION DETAILS – SHEET 2 OF 3 | SP###-1000\_EE-DRG-0024 |
| [value] | CONSTRUCTION DETAILS – SHEET 3 OF 3 | SP###-1000\_EE-DRG-0025 |
| [value] | INSTALLATION DETAILS – FIELD INSTRUMENTS | SP###-1000\_EE-DRG-0026 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0027 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0028 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0029 |
| [value] | *RESERVED DRAWING SHEET* | SP###-1000\_EE-DRG-0030 |
| [value] | GENERAL ARRANGEMENT \_ MAIN SWITCHBOARD - ELEVATIONS | SP###-1000\_EE-DRG-0031 |
| [value] | GENERAL ARRANGEMENT – MAIN SWITCHBOARD \_ SECTIONS | SP###-1000\_EE-DRG-0032 |
| [value] | *RESERVED (GENERATOR EXTERNAL CONNECTION BOX)* | SP###-1000\_EE-DRG-0033 |
| [value] | CLEARANCE REQUIREMENTS – MAIN SWITCHBOARD | SP###-1000\_EE-DRG-0034 |
| [value] | *RESERVED SWITCHBOARD SLAB – LOCALITY & SITE PLANS – SHEET 1 of 3* | SP###-1000\_EE-DRG-0035 |
| [value] | *RESERVED SWITCHBOARD SLAB AND CONDUIT DETAILS – SHEET 2 OF 3* | SP###-1000\_EE-DRG-0036 |
| [value] | *RESERVED SWITCHBOARD & ELECTRICAL CONDUIT LAYOUT – SHEET 3 OF 3* | SP###-1000\_EE-DRG-0037 |
|  |  |  |

## Appendix 2 – Typical Electrical Drawings

Table 5‑2 Typical Electrical Drawings

| **URBAN UTILITIES DWG No** | **Title** |
| --- | --- |
| SP###-1000\_EE-DRG-0001 | DRAWING INDEX |
| SP###-1000\_EE-DRG-0002 | SINGLE LINE DIAGRAM -400VAC & 230VAC |
| SP###-1000\_EE-DRG-0003 | POWER DISTRIBUTION SCHEMATIC DIAGRAM -400VAC & 230VAC |
| SP###-1000\_EE-DRG-0004 | SCHEMATIC DIAGRAM – SUBMERSIBLE PUMP No1 |
| SP###-1000\_EE-DRG-0005 | SCHEMATIC DIAGRAM – SUBMERSIBLE PUMP No2 |
| SP###-1000\_EE-DRG-0006 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0007 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0008 | SCHEMATIC DIAGRAM – MANUAL TRANSFER SWITCH |
| SP###-1000\_EE-DRG-0009 | SCHEMATIC DIAGRAM- COMMON CONTROLS |
| SP###-1000\_EE-DRG-0010 | SCHEMATIC DIAGRAM – COMMON RTU I/O |
| SP###-1000\_EE-DRG-0011 | SCHEMATIC DIAGRAM – 24VDC DISTRIBUTION & RTU LAYOUT |
| SP###-1000\_EE-DRG-0012 | TERMINATION DIAGRAM - RTU DIGITAL INPUTS \_ SHEET 1 OF 2 |
| SP###-1000\_EE-DRG-0013 | TERMINATION DIAGRAM – RTU DIGITAL INPUTS 2 OF 2 |
| SP###-1000\_EE-DRG-0014 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0015 | TERMINATION DIAGRAM – RTU DIGITAL OUTPUTS – SHEET 1 OF 2 |
| SP###-1000\_EE-DRG-0016 | TERMINATION DIAGRAM – RTU DIGITAL OUTPUTS – 2 OF 2 |
| SP###-1000\_EE-DRG-0017 | TERMINATION DIAGRAM – RTU ANALOGUE INPUTS |
| SP###-1000\_EE-DRG-0018 | TERMINATION DIAGRAM – RTU ANALOGUE OUTPUTS |
| SP###-1000\_EE-DRG-0019 | TERMINATION DIAGRAM – COMMON CONTROLS |
| SP###-1000\_EE-DRG-0020 | EQUIPMENT SCHEDULE |
| SP###-1000\_EE-DRG-0021 | CABLE SCHEDULE |
| SP###-1000\_EE-DRG-0022 | LABEL SCHEDULE |
| SP###-1000\_EE-DRG-0023 | CONSTRUCTION DETAILS – SHEET 1 OF 3 |
| SP###-1000\_EE-DRG-0024 | CONSTRUCTION DETAILS – SHEET 2 OF 3 |
| SP###-1000\_EE-DRG-0025 | CONSTRUCTION DETAILS – SHEET 3 OF 3 |
| SP###-1000\_EE-DRG-0026 | INSTALLATION DETAILS – FIELD INSTRUMENTS |
| SP###-1000\_EE-DRG-0027 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0028 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0029 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0030 | *RESERVED DRAWING SHEET* |
| SP###-1000\_EE-DRG-0031 | GENERAL ARRANGEMENT \_ MAIN SWITCHBOARD - ELEVATIONS |
| SP###-1000\_EE-DRG-0032 | GENERAL ARRANGEMENT – MAIN SWITCHBOARD \_ SECTIONS |
| SP###-1000\_EE-DRG-0033 | *RESERVED (GENERATOR EXTERNAL CONNECTION BOX)* |
| SP###-1000\_EE-DRG-0034 | CLEARANCE REQUIREMENTS – MAIN SWITCHBOARD |
| SP###-1000\_EE-DRG-0035 | *RESERVED SWITCHBOARD SLAB – LOCALITY & SITE PLANS – SHEET 1 of 3* |
| SP###-1000\_EE-DRG-0036 | *RESERVED SWITCHBOARD SLAB AND CONDUIT DETAILS – SHEET 2 OF 3* |
| SP###-1000\_EE-DRG-0037 | *RESERVED SWITCHBOARD & ELECTRICAL CONDUIT LAYOUT – SHEET 3 OF 3* |
|  |  |

## Appendix 3 – Pump Selection Details

## Appendix 4 – Rising Main Selection Details

## Appendix 5 – Details of Proposed Variations

| **No.** | **REFERENCE**  ***(to standard document, including Clause No.)*** | **REASONS FOR PROPOSED DEAPRTURE** | **DETAILS OF PROPOSED Departure** |
| --- | --- | --- | --- |
| 1 |  |  |  |
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