Unitywater

Serving you today, **investing in tomorrow.**

Pr11337 - Specification for Low Pressure Sewerage Systems

Addendum to WSA07 Pressure Sewerage Systems Code Version 1.1 2007 (including the SEQ Service Providers Edition 2020)

This addendum should be read in conjunction with WSA07 2007 v1.1

Pr11337 - Specification for Low Pressure Sewerage Systems (addendum to SEQ-WSA07)

Document Sponsor	Infrastructure Standards and Products Approval Committee
Document Owner	Head of Asset Management
Subject Matter Expert	Infrastructure Standards and Assurance Manager
References	Refer to Section C – References of this document

Version review

Revision	Reviewed by	Approved by	Date approved	Revision type/summary
1	Y. Skinner	N. Tompkins A/Head of Asset Management	22/12/2025	Original

Contents

Not all clauses from the WSAA Pressure Sewerage System Code are shown in this LPSS Code. As a result, the clause numbering within the LPSS Code is not always sequential – this is not an error.

List of Tables

No table of figures entries found.

List of Figures

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INTRODUCTION TO UNITYWATER ADDENDUM

A. PURPOSE

This Low Pressure Sewerage System Design and Construction Code (LPSS Code) is an Unitywater addendum incorporating the SEQ Pressure Sewerage System Design and Construction Code (SEQ WSA07 Code) which is based on the Water Services WSAA Pressure Sewerage System Design and Construction Code – Version 1.1 (2007). The purpose of this specification to assist engineering consultants prepare design documentation for proposed low pressure sewerage systems to be owned and operated by Unitywater.

This specification defines Unitywater's requirements for the design, construction, commissioning, and handover of any new pressure sewerage systems to be located within Unitywater's water network.

This document must be read in conjunction with the WSAA Pressure Sewerage System Design and Construction Code – Version 1.1 (2007). The documents incorporates both the SEQ Pressure Sewerage System Design and Construction Code (SEQ WSA07 Code 2020) requirements and Unitywater's requirements. This Specification shall also be read in conjunction with relevant project drawings (where applicable), project specification and supplementary specifications.

For information on abbreviations, acronyms and definitions used within this document, please refer to the current SEQ Water Code.

Unitywater will update this document as Unitywater's technical requirements for Low Pressure Sewerage Systems (LPSS) evolve over time.

Unitywater reserves the right to specify or approve other LPSS design and/or construction requirements for projects and/or developments. Before commencement of any construction, Unitywater's approval shall be obtained for any design and/or installation that does not comply with this document.

B. SCOPE

This LPSS Code is only applicable for the design and construction of LPSS to be owned and operated by Unitywater. For information regarding design and construction requirements for LPSS (to be) owned and operated by other Service Providers (e.g. City of Gold Coast, Logan City Council, Redland City Council, Urban Utilities, etc.) please contact them directly.

The Project Proponent is responsible for obtaining all third-party approvals relating to the design and construction of Unitywater LPSS infrastructure. All third-party approvals shall be obtained by the Project Proponent and submitted to Unitywater during the LPSS design phase. It is the Project Proponent's responsibility to prepare the design in accordance with the requirements of all relevant stakeholders.

Please note, any endorsement of the design documentation by Unitywater does not infer that any other agency has endorsed/accepted the design.

The Project Proponent (and their consultants/agents) are responsible for ensuring that all works are executed in accordance with Unitywater requirements, as well as sound engineering principles and practices.

All designs shall be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) considering all relevant construction, operational, maintenance, repair and demolition aspects of the proposed works. As-constructed works shall be certified by a Registered Professional Engineer of Queensland (RPEQ).

B.1 Conditions of Supply of the Unitywater LPSS Code

The LPSS Code is supplied subject to the following understandings and conditions:

- The LPSS Code is copyright and apart from any use as permitted under the *Copyright Act 1968*, no parts of the documents may be sold, reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior permission in writing of Unitywater.
- This LPSS Code is intended for use in connection with Unitywater related projects only.
- Unitywater does not warrant the applicability of the LPSS Code and SEQ Water Supply & Sewerage Design & Construction Code to climates, topography, soil types, water characteristics and other local conditions and factors that may be encountered outside Unitywater area of operation.
- The holder of the LPSS Code acknowledges that they may contain errors and/or omissions.
- Unitywater accepts no responsibility for the incorrect application of the LPSS Code by the holder or any other party.

Any details not currently denoted in the LPSS Code shall be referred to Unitywater.

B.2 Technical Deviations

Departures from any requirement of this Technical Standard shall be identified and submitted for review via F10996 - Deviation to Unitywater Technical Specification.

Unitywater requires enough information to assess dispensation requests and their potential impact. The onus is therefore on the proponent to justify deviation request submissions and provide suitable evidence to support them.

The Designer shall not proceed to document/incorporate the non-conforming work before the Unitywater has assessed and accepted the proposed action in writing via F10996.

C. REFERENCES

Unitywater has developed a guide to the technical engineering specifications or documents that may be required to be used when undertaking the design, construction, commissioning and/or handover of assets. Pr11231 - Unitywater Technical Specification Reference Guide.

C.1 Document Hierarchy

If there is a discrepancy between this document and the SEQ Water Supply & Sewerage Design Criteria (SEQ WS&S Design Criteria), the SEQ WS&S Design Criteria shall take precedence.

If there is a discrepancy between the LPSS Code and the SEQ Service Providers Edition of the Pressure Sewerage System Code (SEQ LPSS Code), this LPSS Code shall take precedence for all matters relating to LPSS.

Where the underlying SEQ sewage rising main requirements are not shown in this document, the SEQ Sewage Pumping Station (SPS) Code requirements shall apply.

If there is a discrepancy between the LPSS Code text and the LPSS Code Appendices (including details shown in the Example Drawings, the LPSS Code text shall take precedence.

Where a discrepancy exists between the LPSS Code and any other relevant document (including Unitywater documents/specifications/requirements), please consult with Unitywater to seek advice regarding which requirement takes precedence.

C.2 Feedback and Information

Please direct all comments and suggestions regarding this document by email to: seqcode@unitywater.com.

For further information on the South East Queensland Water Supply and Sewerage Design Construction Code (SEQ Code), or to provide comments and suggestions, visit www.seqcode.com.au.

UNITYWATER LOW PRESSURE SEWERAGE SYSTEM DESIGN AND CONSTRUCTION CODE

ADDENDUM TO THE WSAA PRESSURE SEWERAGE SYSTEM CODE OF AUSTRALIA V1.1 (APRIL 2020) incorporating the SEQ Pressure Sewerage System Design and Construction Code (SEQ WSA07 Code)

USING THE LPSS CODE

- This LPSS Code shall be read in conjunction with the WSAA Pressure Sewerage System Code. It includes the SEQ Service Providers Edition amendments.
- Unitywater LPSS requirements consist of the requirements within the LPSS Code, as well as the WSAA Pressure Sewerage System Code and the SEQ Service Providers Edition text.
  NOTE: the entire WSAA Pressure Sewerage System Code text has not been duplicated within this document.
- Where an WSAA Pressure Sewerage System Code clause is not detailed within the LPSS Code, refer back to the WSAA Pressure Sewerage System Code for the requirements.

LPSS CODE CLAUSE NUMBERING

- **Not all clauses from the WSAA Pressure Sewerage System Code are shown in this LPSS Code. As a result, the clause numbering within the LPSS Code is not always sequential – this is not an error.**
- Generally, only Clauses which contain amendments to the text of either the WSAA Pressure Sewerage System Code or the SEQ Service Providers Edition LPSS Code, specifically for the design and construction of Unitywater LPSS, are shown in this document.
- Clause numbering and clause headings used in the LPSS Code correspond with the same clause numbering & headings used in the WSAA Pressure Sewerage System Code text.

LPSS CODE TEXT COLOURING

Black Text:	the WSAA Pressure Sewerage System Supply Code
Green Text:	SEQ Service Providers Edition amendments to the WSAA Pressure Sewerage System Supply Code text
Purple Text:	Unitywater specific amendments to the WSAA Pressure Sewerage System Supply Code text, specifically relating to the design and construction of Unitywater low pressure sewerage systems
Blue Italic Text:	details the changes in the text of a clause

INTRODUCTION

Scope of Code

The Pressure Sewerage Code of Australia covers the planning, design and construction of reticulation pressure sewers and laterals up to and including DN 250, discharge lines, collection/pump units and other appurtenances.

The Code does not specifically address sanitary drains used in private and community title developments that are connected to a collection/pump unit. However, where those drains are likely to be maintained by the Water Agency or its contractor, it is recommended that the SEQ Code Edition of WSA 02 (Gravity) Sewerage Code of Australia be adopted as an alternative solution for the sanitary drainage systems specified in the Plumbing Code of Australia.

Code Purpose

Insert the following paragraphs at end of this section:

The SEQ Design & Construction Code sets out SEQ Amendments to The Pressure Sewerage Code of Australia. The SEQ Amendments include:

- The SEQ-SPs requirements for specific detail which the Code anticipates individual water agencies will address, and
- Additions, deletions and variations to the Code where the Code's requirements are not compatible with the SEQ-SPs current requirements (due to local practice, climate, geographic and topographic conditions and statutory requirements, etc) or where the Code is otherwise silent.

Any reference to the Pressure Sewerage Code of Australia ("the Code") shall be deemed to refer to the SEQ Design & Construction Code which contains the SEQ Amendments. The Code specifies mandatory requirements for the design and construction of Pressure Sewer that are to become the responsibility of the SEQ-SPs.

The SEQ-SPs reserve the right to specify or approve other design and/or construction requirements for particular projects and/or developments. Before commencement of any construction, the SEQ-SPs approval shall be obtained to any design and/or installation that do not comply with the Code.

Insert the following title and note after "Mandatory and Informative" *Clause:*

Drawings and Figures

Drawing references are added throughout the Code. In the event of a clash between the individual drawings and the figures in the Code – the details shown on the individual ~~standard~~ typical drawings take precedence. The typical drawings must be adapted to the requirements of the particular system or network and accompanied by detailed designs certified by an RPEQ.

Insert the following clauses at the end of the "Proposed Amendments" Clause:

Users of the SEQ Design & Construction Code are invited to suggest amendments or improvements to the technical content and format or style of the document by contacting the individual SEQ-SPs.

Using of the SEQ Integrated Code

~~As you read through the SEQ Integrated Code, you will note that a bold vertical line appears in the left-hand margin beside some clauses and paragraphs or parts thereof. The line indicates that there has been an amendment made by SEQ Service Providers to that particular paragraph or clause of the WSAA edition i.e. material has been modified, added and/or no longer relevant. In addition to the marginal marking~~ Ggeneral modified and/or added text (those agreed to by all Service Providers) appears in a green coloured font and the specific requirements of ~~each Service Provider~~ Unitywater appears in a ~~red~~ purple coloured font. The text that is no longer relevant in the Code is not removed from the text, however a line is placed through the text.

Conditions of Supply of SEQ Design and Construction Code

SEQ Design & Construction Code is supplied subject to the following understandings and conditions:

- SEQ Design & Construction Code is copyright and apart from any use as permitted under the Copyright Act 1968, no parts of the documents may be sold, reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior permission in writing of SEQ-SPs.
- SEQ Design & Construction Code is intended for use in connection with SEQ-SPs related projects only.
- SEQ-SPs do not warrant the applicability of SEQ Design & Construction Code to climates, topography, soil types, water and sewage characteristics and other local conditions and factors that may be encountered outside SEQ-SPs area of operations.
- The holder of SEQ Design & Construction Code acknowledges that they may contain errors and/or omissions.
- SEQ-SPs accept no responsibility for any works or parts thereof which may contain design and/or construction defects due to errors or omissions in any part of a SEQ Design & Construction Code which has not been prepared or formatted by SEQ-SPs.
- SEQ-SPs accept no responsibility for the incorrect application of SEQ Design & Construction Code by the holder or any other party.

Part 0: Glossary of Terms,

GLOSSARY OF TERMS

Add the following term and definition in alphabetical order:

TERM	DEFINITION
on-property components of pressure sewer system	Assets owned by the property owner for the collection of wastewater within the property boundary for connection to the sewerage system including the sanitary drain, grinder (or macerator) pump(s), collection tank, electrical works, control / alarm panels, property discharge line and boundary kit (up to but not including the property isolation valve).

TERM	DEFINITION
property isolation valve	Valve located on public property immediately outside the boundary of the private property being serviced. It serves to connect the property boundary kit (private components) to the pressure sewer lateral (public components).
SEQ Design & Construction Code **(SEQ Code)**	The SEQ Design and Construction Code is required by legislation and is an instrument— • made jointly by the SEQ-SPs; and • that provides for technical standards relating to the design and construction of pressure sewerage infrastructure in the SEQ region.
SEQ Service Provider (SEQ –SP)	Providers of water services to individual customers/groups of customers. Services to the South East Corner are specified in the South-East Queensland Water (Distribution and Retail Restructuring) Act and Natural Resources Provisions Act 2009 and service providers include City of Gold Coast, Redland City Council, Logan City Council, Urban Utilities and Unitywater.

FIGURE I PLAN OF TYPICAL ON-PROPERTY COMPONENTS OF PRESSURE SEWER SYSTEM
*** #**

***Note:** **Figure below shows the preferred location of on-property components in both existing developed property and new subdivisions/developments. ~~Figure shows an existing developed property.~~ Refer to Section 6 and Standard Drawings ~~PSS–1100~~ SEQ-PSS-1100-1, ~~PSS–1101~~ SEQ-PSS-1101-1 and ~~PSS–1102~~ SEQ-PSS-1102-1 for details.**

Note: The connection to the pressure sewer network shall be via a Y-Junction. The property isolation valve shall be installed immediately outside property boundary

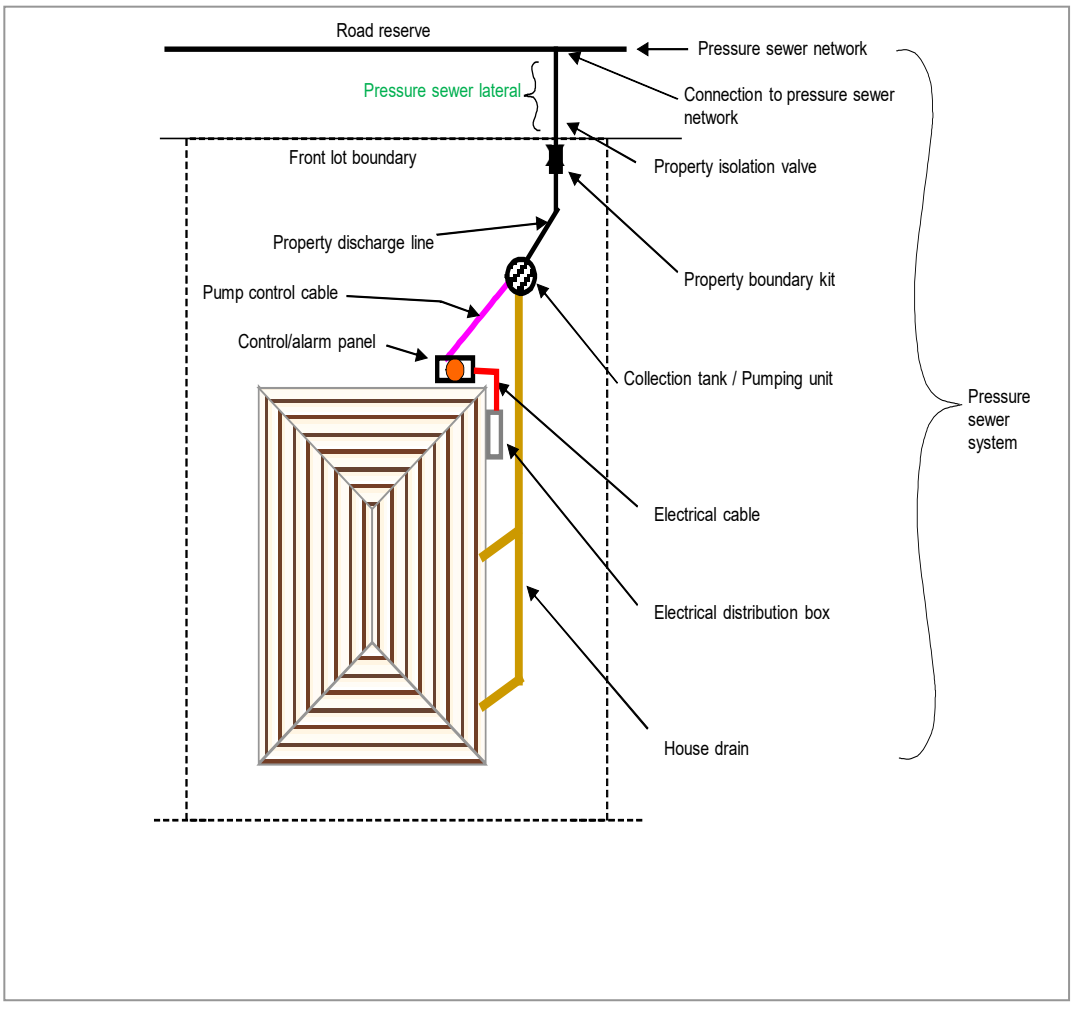
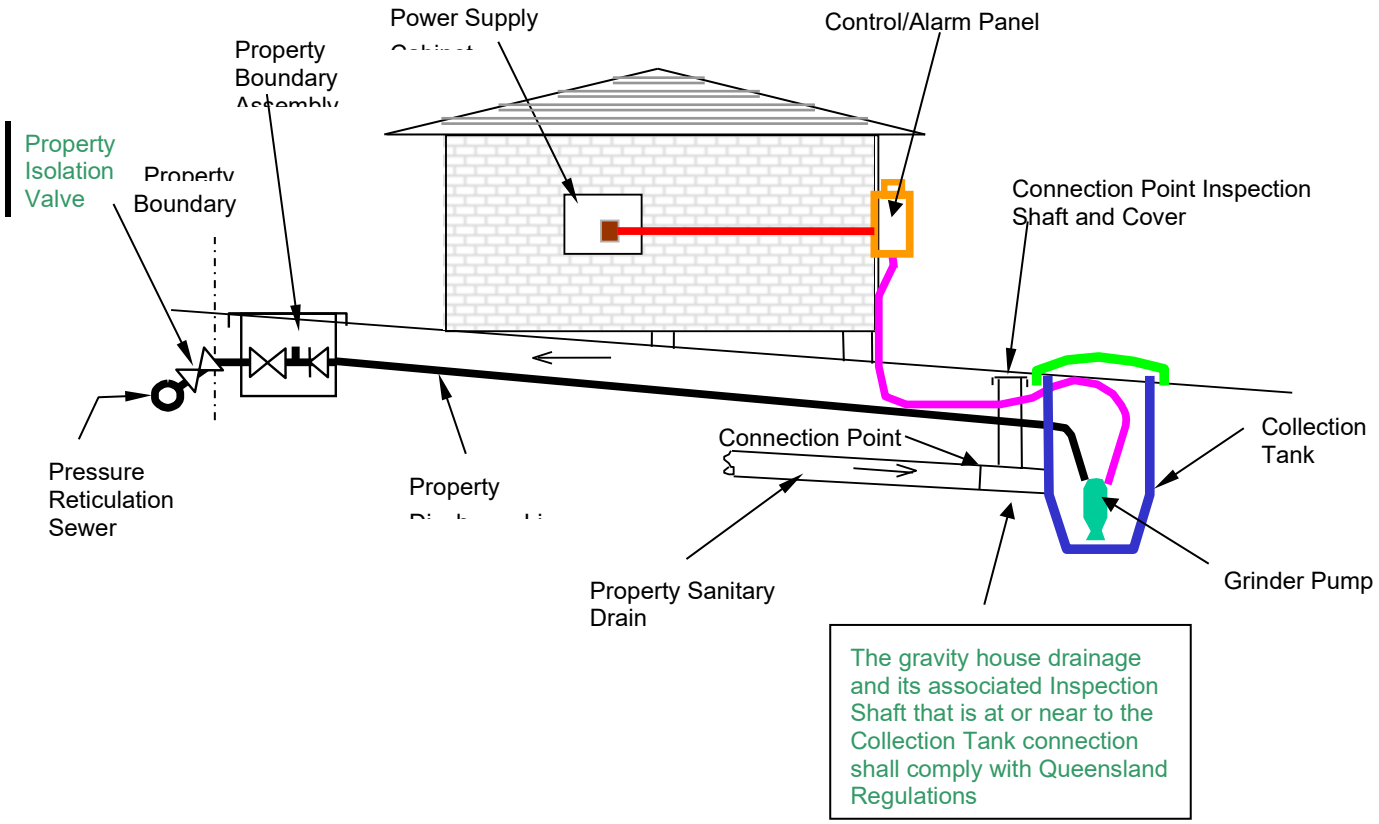


FIGURE II SECTION OF TYPICAL ON-PROPERTY COMPONENTS OF PRESSURE SEWER SYSTEM FOR SERVICING EXISTING PROPERTIES



ABBREVIATIONS

Add the following abbreviations and interpretations in alphabetical order:

ABBREVIATION	INTERPRETATION
ADAC	Asset Design As Constructed
SEQ-SP	South East Queensland Water Services Provider

REFERENCED DOCUMENTS

Amend the following references in this section

Delete the first three rows that make reference to the documents WSA 02, WSA 03 and WSA 06.

Add the following references to the end of the table to read:

STANDARD	TITLE	CLAUSE/TABLE/DRAWING
SEQ-WSA 02	SEQ (Gravity) Sewerage Code	1.1, 1.7.1, 4.2, 4.4.1
SEQ-WSA 03	SEQ Water Supply Code	27.2
SEQ-WSA 06	SEQ Vacuum Sewerage Code	9.2.6

PART 1: PLANNING AND DESIGN

PREFACE

Add the following paragraphs at the end of the clause and before Figure 1:

General

Pressure sewers shall not to be used as a substitute for gravity sewers. Pressure sewers may only be used where the construction of gravity sewers are not practical.

Where site constraints make a gravity sewer difficult to implement, the developer shall negotiate with the relevant SEQ-SP, and approval is required in the planning stage.

Written consent from the relevant SEQ-SP is required for acceptance of pressure sewers.

Pressure sewers may be used for residential lots or non-residential lots where effluent is equivalent to residential. For large industrial or commercial development, alternative configurations need to be considered.

All on-property components of a low pressure sewer system, including customer sanitary drains; grinder pumps / collection tanks; control / alarm panels; property discharge lines and boundary kits (up to but not including the property isolation valves) **shall be owned and maintained by property owner**. Refer to Drawing SEQ-PSS-1101-1 for the typical components layout. All on-property designs shall be submitted to **Council's Plumbing Services Group for acceptance**. *The property isolation valves provide a boundary between public reticulation components and private on-property components in terms of ownerships, licensing of installers and inspection of work etc.*

All reticulation components outside the serviced properties shall be owned and maintained by **the relevant SEQ-SP**. The detail design with design calculations of the reticulation system shall be supplied to **the relevant SEQ-SP** for review.

Where Pressure Sewerage Systems are the means of Reticulated Sewerage for a property, the on-property components of the Pressure Sewerage System shall comply with the requirements of SEQ-WSA-07. The Plumbing Application shall be made with the specific components defined so that the SEQ Water Service Provider can review and advise the Council Plumbing Department of the compliance or not of the proposal.

Innovative Solutions

SEQ-SPs encourage any innovation that offers enhanced productivity and serviceability; however, the relevant SEQ-SP input and endorsement must be obtained before acceptance of any innovative system.

Responsibilities

The nominated Registered Professional Engineer of Queensland (RPEQ) is responsible to ensure that the design aspects and the constructed works comply with the requirements set out in the SEQ-SPs Pressure Sewers. The RPEQ must ensure that SEQ-SPs's endorsement is obtained for any variations from these requirements. Any change of the nominated RPEQ shall be accompanied with the transfer of responsibilities for all works including works completed prior to the change of RPEQ.

Disclaimer

Whilst SEQ-SPs endeavours to ensure that the accuracy of the information contained in this document, the SEQ-SPs will not be liable for any loss or damage that may occur as a result of using the information contained herein.

1. GENERAL

On-property components of pressure sewer system are owned and maintained by residents/landowner.

Developer to provide a ten year maintenance plan as a condition for obtaining planning approval.

1.1 PLANNING

In the first two paragraphs, change the reference to WSA 02 as follows:
"WSA 02 Sewerage Code of Australia" to *"SEQ Code edition of WSA 02 (Gravity) Sewerage Code of Australia"*
and
"WSA 02" to *"SEQ Code edition of WSA 02"*

Part 1 Planning and Design of SEQ Code edition of WSA 02 (Gravity) Sewerage Code of Australia covers Water Agency requirements for system planning of sewerage. Identification of the need for gravity or vacuum or pressure sewer systems is an element of system planning.

1.5 PLANNING AND DESIGN RESPONSIBILITIES AND INTERFACES

1.5.2 Planning responsibilities

Delete the whole second sentence as below:

The Water Agency is generally responsible for overall planning for the provision of sewerage services to its customers. ~~Unless otherwise agreed between relevant parties, the Water Agency should provide a Concept Plan setting out essential inputs to be used in design, such as catchment area, flows, flow estimating methodology, collection/pump unit type, discharge point, recommended staging, pressure sewer network layout, or particular requirements of the Water Agency.~~

1.5.3 Design responsibilities

Replace the third paragraph with the following paragraphs:

In the design of a pressure sewer system, a significant amount of the system, critical to the operation, actually takes place on the individual homeowner's private properties. This increases the level of detailed on-site information needed to complete the design of the system. It is necessary to consider the operational involvement associated with accessing, maintaining and repairing the on-site components to ensure a continually reliable system. These circumstances warrant a system of the highest quality that balances cost, performance, safety, customer satisfaction, and operational reliability.

The design of the low pressure system including pressure mains and associated components shall be undertaken and certified by a Registered Professional Engineer of Queensland (RPEQ) with minimum of 3 years continuous experience of the design and installation on low pressure sewer systems.

Pressure sewer design shall be separated into two components, reticulation design and on-property design. Refer to Clause 'General' in 'Preface' of Part 1 for the ownerships and responsibilities of the two components.

Reticulation Design concerns the design of the actual pressure sewer reticulation system including all components outside the serviced property, i.e. pressure sewer laterals (including property isolation valves), isolation valves and flushing points etc.

On-Property Design concerns the design of the property boundary assemblies and discharge lines (up to but not including property isolation valves), collection tanks / pump units, control / alarm panel, electrical cables and property sanitary drains etc.

Replace the words "the Water Agency's" with the words "an agreed" in item (a) of this clause. So it reads as:

a) translating the planning output into a detailed system/network design. The Designer shall undertake the necessary design and prepare Design Drawings compatible with an agreed Concept Plan and the design parameters (as detailed in this Code and/or Water Agency requirements);

Add the words "and gas valves" at the end of item (iv) (H). So this item read as:

(H)locations of cleanouts, flushing points, isolation valves and gas valves;

1.6.1 System design life

Adjust the nominal design life for grinder pumps to 10

TABLE 1.1 NOMINAL ASSET DESIGN LIFE

Item	Pressure sewers and laterals	Property discharge lines	collection tanks	Grinder pumps1	Property boundary assemblies and isolation valves	Non-return and air release valves	Controls
Nominal design life, years	100	100	100	~~25~~ 10	30	20	15

1.6.2 Objectives of the system design

The sewer system shall provide:

a) Least life cycle cost with acceptable risk;
b) A single connection for each property;
c) A level of service to the Water Agency's customers in accordance with the Unitywater's policies, customer charters and operating contracts;
d) Unitywater's standards not otherwise contained or referenced by this Code;
e) Minimal adverse environmental and community impact;
f) Compliance with environmental requirements;
g) Compliance with WH&S requirements including requirements under the Queensland WH&S Act 2011;
h) Sufficient emergency storage to meet agreed maintenance response times;
i) A pressure tight system;
j) Minimal potential for infiltration / exfiltration in the customer sanitary drain and connection;
k) Control of odours;
l) Safe and easy access for operations and maintenance;
m) Minimal maintenance;
n) Resistance to internal and external corrosion and chemical degradation;
o) The ability to manage wet weather flows;
p) Sufficient hydraulic capacity for the schemes ultimate service area;
q) Provision to scour the main lines.
r) physically confirmed locations and alignments of Unitywater and other Utilities (or Service Providers) infrastructure which may be impacted by the proposed works in accordance with AS 5488.1 Classification of subsurface utility information Part 1: Subsurface utility information Quality Level A requirements;
s) all work associated with the potholing and survey of services shall ensure that service locations and alignments are accurately reflected in the design drawings; and
t) impacts to Stakeholders, customers, community, Local Authority, Road Authorities and service providers (e.g. Rail Authority);

In addressing the above requirements, the Basis of Design Report shall be developed in accordance with relevant Queensland legislation and regulations, Codes of Practice, Australian Standards and Unitywater technical standards.

A summary of the planning and design approach adopted in this Code is shown in **Figure 1.1**.

1.6.3 Design output

Add the following dot points and paragraphs:

c) Documentation of design assumptions, constraints and issues relevant to the design and not otherwise noted in the Concept Plan or Design Drawings or Specifications.
d) Any variations to this LPSS Code, and the reason for the variation, shall be highlighted in a boxed note on the design drawings.
e) Basis of Design Report.
f) Safety in Design Report.
g) Detailed drawings and relevant specifications (including structural, electrical, mechanical, control system, process logic, civil and hydraulic design).

In addition, refer to Appendix LPSS-A for a list of relevant Example Project Drawings and Unitywater Typical Drawings that may also be used for guidance only. NOTE: These drawings are not intended for use in LPSS designs. The Example Project Drawing and SEQ Code Standard Drawings are not suitable for construction without further engineering design.

1.7.1 Concept Plan

In the first sentence of this Clause, change the reference of Clause 1.5 to Clause 1.3 and change the reference to "WSA 02" to "SEQ Code edition of WSA 02".

1.7.4 Safety in design

The design process and outputs shall satisfy requirements of the relevant WHS legislation/act and/or regulations.

Refer to Unitywater document Pr8187 - Safety In Design Procedure.

1.8 INSTRUMENTATION AND CONTROL SYSTEMS

All designs incorporating monitoring and control equipment shall comply with the current issue of Unitywater's standard(s). Refer to Pr11231 – Unitywater Technical Specification Reference Guide for list of relevant Unitywater Documents.

2.1LIFE CYCLE CONSIDERATONS

Amend the second sentence as follows:

The life cycle evaluation shall also consider community costs (e.g. power costs to the customer) and where known environmental impacts and implications.

Amend (f) as follows:

(f) operating and maintenance costs over the life of the system. Operating costs will include energy costs and any other costs (such as additional flushing costs, including energy) associated with staging of the development and maintenance costs over the life of the system; and

2.2 FUNCTIONALITY

Amend (d) as follows:

(e) (d) Pump design flows across the expected normal ~~and~~ operating pressures.

Add at the end of the section:

The ability to respond to widespread and lengthy power outages and to system wide failure will be evaluated as part of meeting the minimum standard for system functionality.

2.4 RELIABILITY

Add at the end of the section:

When planning pressure sewerage systems in areas of known poor power supply reliability, the availability of dual network power supplies to the area being served will be investigated to minimise the impact of widespread power outage on reliability of the system.

2.7 STAGING

Add at the end of the section:

Staging of the development will need to be considered during planning and design to ensure that the system meets the performance requirements of the code during all stages of development. Where additional operational flushing is required to achieve the required performance, the flushing requirements (location, volume, duration and regularity) are to be documented in the planning and design documentation. Any other measures adopted to address hydraulic requirements during the staged development, including temporary connections must be detailed and assessed during the planning and design phases.

In reviewing the performance of the system at various stages the following must be considered:

i. Likely lot connection dates, rather than lot 'release' dates
ii. Ensuring the timed-release of lots aligns with any necessary capacity upgrades to downstream wastewater infrastructure downstream of the connection point
iii. Increases in sewage detention times and impacts on system odour and corrosion potential
iv. Achieving minimum peak pipe flow velocities
v. Impact on dead end sections
vi. Mains with small numbers of connections during early connection stages.

2.8.1 Septicity

Add at the end of the Clause:

More recent research is also available from the SCORe project. Refer to Clause 3.15.

Hydrogen Sulphide Control Manual—Septicity, Corrosion and Odour Control in Sewerage Systems, Technological Standing Committee on Hydrogen Sulphide Corrosion in Sewerage Works, Volumes 1 and 2, Melbourne Metropolitan Board of Works, Dec 1989. Reprints available from WSAA.

2.8.2 ~~Sewage quality / Trade waste management –~~ *Do not use this section*

2.9 ODOUR CONTROL

Add at the following paragraphs after the second paragraph:

SEQ-SPs will require the designer to provide a report detailing the odour generation potential. This analysis shall take into consideration the sewage detention time both within collection units and the pressure pipe lines. This will also include the impact of any proposed development staging (refer clause 2.7). Such analysis including odour calculation shall be submitted to SEQ-SPs for review.

During concept design, the assessment of odour potential will be determined based on the average age of the wastewater and Table 3.2 of WSA-07. During detailed design stage, the odour potential will be determined by modelling both sulphide generation and sewage age.

The Designer will document all proposed ventilation and odour control measures. Odour control to be installed in accordance with the outcomes of the designers odour management study. Potential odour control measures include:

a) Location of air valves and or vents to minimise impacts
b) Use of vent stacks (with odour scrubbing where necessary)
c) Chemical dosing

For vent pole details refer to Drawing SEQ-SPS-1405-2.

Where chemical dosing is required, Unitywater shall be consulted to determine the appropriate chemical to be dosed as well as the method and the location of dosing.

For properties below flood level (e.g. 1 in 100yr) where tank lid is sealed, the ventilation needs to be located well away from residential areas as agreed with the relevant SEQ–SP.

2.12.1 General

Add the following additional requirement to the end of this Clause:

The designers shall undertake Safety in Design, HAZID, HAZOP, and CHAIR workshops as detailed in Unitywater document Pr8187 - Safety in Design Procedure.

2.13.1 General

Add the following additional requirement to the end of this clause:

Ownership of on-property components (up to but not including the property isolation valve) will not transfer to SEQ-SPs. Refer to Clause 'General' in 'Preface' of Part 1 this Code.

3.2 DESIGN TOLERANCES

Amend (b) (i) as follows:

(i) Reticulation mains to meet minimum cover requirements shown on Standard Drawing SEQ-PSS-1000-1 ~~PSS–1000~~. The maximum cover over reticulation mains shall be 1500 mm.

Amend the last paragraph as follows:

Horizontal alignment shall be referenced to the Water Agency's preferred coordinate system, (eg Geodetic Datum of Australia 2020 (GDA2020),~~MGA or GDA),~~ and, where possible, to local property boundaries. Levels shall be referenced to Australian Height Datum (AHD).

3.6 ENVIRONMENTAL, CULTURAL AND HERITAGE CONSIDERATIONS

3.6.1 General

Amend the first paragraph as follows:

When selecting the sites of the collection tanks and the route(s) of pipeline(s), the Designer shall comply with the requirements of the project impact assessment with respect to environmental, archaeological and/or cultural heritage considerations. ~~EIA where~~ Where an EIA and/or cultural and heritage impact assessment does not exist, ~~it is a regulatory requirement. Where an EIA is not required~~ the Designer shall consider the ~~environmental~~ impacts of the project for both construction and operational phases in the light of Commonwealth, state, territory and local government environmental, culture and/or heritage laws and regulations and Water Agency policies, instructions and guidelines.

Amend (d) as follows:

(d) Waterways, retarding basins, ~~and~~ floodways and flood prone areas within the 1 in 5 year recurrence interval

Amend (i) as follows

(i) Use of trenchless excavation methods ~~no-dig~~ excavation methods such as tunnelling, boring, directional drilling and micro-tunnelling.

3.6.3 Vegetation

Amend the third sentence with the following:

Trees of significance located along the proposed route of the pipeline shall be identified for protection and a record, including details of their health, stability and importance, shall be established.

The removal of a tree may have a major impact on the quality of the local environment or the value of a particular property. Some cases may require consultation with the Water Agency or other expert advice may be needed. One effective way of conserving a valuable environment is by specifying that construction methods, such as no dig techniques, within the drip line of the tree are to be used. Lot Owners should also be consulted. It may not be necessary to alter designs to avoid damage to diseased or damaged trees or those an Owner and Council have no wish to save.

Alternatively, it may be necessary to avoid designing pressure reticulation sewers close to trees that are unstable and may be further affected by sewer construction, unless they can be lopped or removed. This applies particularly to trees that are leaning over existing buildings. Trees that will affect sewer construction should be shown on the Design Drawings.

The impact of tree roots should also be considered when establishing the sewer alignment. Pipeline alignment and selection should account for trees with intrusive root systems with the potential to cause structural damage and/or blockages.

Specialist advice should be sought as a permit may be required for tree removal and the cost and constraints of such action may be a design consideration.

3.6.4 Contaminated sites

Amend (a) as follows:

(a) Need for site contamination assessment ~~by environmental Regulator (if applicable)~~.

Add (h) and (i) as follows:

(h) Previous site remediation (if any)

(i) Limitations, constraints or considerations with respect to the works, identified from enquiries with the Environmental Regulator.

3.6.5 ~~Tidal zones~~ Coastal zones

With around 85% of Australia's population living in the coastal zone, rising sea levels and storm surges will have significant impacts on many of our coastal towns and cities. Understanding the risks to infrastructure and private property is particularly important for highly populated urban areas.

The Australian Government has developed a series of initial sea level rise maps to illustrate the potential impacts of climate change for key urban areas. Refer to http://www.ozcoasts.gov.au/climate/sd_visual.jsp. The maps have been prepared by combining a sea level rise value with a high tide value. They illustrate an event that could

be expected to occur at least once a year, but possibly more frequently, around the year 2100.

For sewers located below the current or predicted high tide or storm surge level, the following requirements shall be specified:

(a) The tops of maintenance structures to be at least 0.9 m above maximum high tide AHD and fitted with watertight type metal access covers.
(b) A sewer material and jointing system suitable for marine environments and protected as necessary from external abrasion, vandalism and UV radiation.
(c) A suitable installation technique for the coastal zone ground conditions.

3.6.6 Acid sulphate soils

Interference with land producing, or likely to produce acid sulphate soil, shall be avoided wherever practicable. *Any design which disturbs acid sulphate soil will present significant environmental risk.*

Where unavoidable, appropriate strategies for management of acid sulphate soil and dewatering activities shall be developed by the Designer to ensure there are no long-term adverse impacts to the environment. *A detailed assessment of the site is an essential prerequisite before deciding on a management approach. Refer to SEQ-WSA02 Section 5.2.7.3*

Where disturbances of acid sulphate soil are unavoidable, preferred management strategies are:

(a) Minimisation of disturbance;

(b) Neutralisation;

(c) Hydraulic separation of sulphides, either on its own or in conjunction with dredging;

(d) Strategic re-burial (reinterment); and

(e) Other management measures may be considered, but may pose increasingly higher or even unacceptably high risks.

The potential risk to the environment shall be quantified, and management techniques proposed to mitigate the environmental impacts associated with the proposed activity both on and off the site.

Management undertaken by the Designer and Contractor during construction of works shall be in accordance with guidelines and licensing requirements of the relevant state or territory and commensurate with the potential for immediate risk to the environment.

National guidance for the management of acid sulphate soils is available from the Water Quality Australia website at https://www.waterquality.gov.au/issues/acid-sulfate-soils.

1 The Water Quality Australia website is a product of the National Water Quality Management Strategy (NWQMS), an Australian Government initiative in partnership with state and territory governments.

State and Territory Agencies responsible for information and direction on acid sulphate soils, including risk map areas of acid sulphate soils, are listed on the following websites:

- *Murray-Darling Basin Authority*
- *Southern Cross University – Geoscience*
- *Western Australian guidelines for managing acid sulfate soil in their regions*
- *Tasmanian Acid Sulfate Soil Management Guidelines*

- *Queensland Government's information on acid sulfate soils*
- *Victorian Government's information on acid sulfate soils*
- *South Australian Acid Sulfate Soils Research Program*
- *New South Wales Government's information on Acid Sulfate Soils*

For sites outside of the defined risk map areas, an assessment of regionally available information shall be undertaken, using key indicators of acid sulphate soils to identify the likelihood of occurrence outside the regionally mapped areas and confirm the risks specific distributing acid sulphate soils and shallow groundwater.

3.6.7 Flooding

To minimise wet weather flows, the Water Agency may require flood mapping demonstrating that wider and local flooding (including overland flow) issues will not occur on developable lots sufficient to cause inflow into the pressure sewerage system.

Collection tank is to be located so that the top of the tank is minimum 300mm above the 1% AEP flood level.

3.7 EASEMENTS

3.7.1 Reticulation sewers

Adjust the second paragraph as follows:

~~*Easements for pipelines may be located over private property, public reserves, crown reserves, other government owned land and private roads or access ways in both conventional and community title subdivisions.*~~ All pressure reticulation sewers shall be located in a dedicated public road reserve or access way.

3.7.2 On-property components

Add the following as the last paragraph in this clause:

The property discharge line for a given property shall not cross onto any adjacent property, or collect the discharge from any other property. Exceptions may include where the property discharge line crosses a common area. Approval by SEQ-SPs will be required for these exceptions.

3.8 RAILWAY RESERVES

Amend the reference to* PSS 1004 *in the last sentence of the clause by replacing with SEQ- PSS-1004-1

3.10 MECHANICAL PROTECTION OF PIPELINES

Amend the dot points to read as follows:

a) Concrete encasement (refer to Standard Drawing SEQ- PSS-1001-1 ~~PSS–1001~~).
b) Placing the pipeline within a bored encasing pipe (Refer to Standard Drawing SEQ-PSS-1002-1 ~~PSS–1002~~ and sealing the pipe at each end of the encasing pipe so as to permit easy replacement should the need arise.
c) Installation of the service pipe inside a carrier pipe. Installation of all pressure sewer laterals crossing roads to be located within a DN 100 PVC conduit with minimum 50mm annular clearance. Refer to SEQ-WAT-1108-1.

3.12.2 Deviation of pipelines around structures

Add the following to the last paragraph:

The use of 90-degree bends will not be permitted. 90-degree bends shall be accomplished by installing two 45-degree bends with a separation of minimum 300 mm.

Where the PE100 PN16 pipeline is curved on site, the minimum radius shall be as per POP 202.

3.12.3 Clearance from structures

Add the following new paragraphs at the end of the clause:

All mains (including privately owned Property Discharge Lines) shall be located with sufficient clearance to structures to allow for maintenance and operation activities. To enable future maintenance and protect the system, a minimum offset of 1m from the any buildings or structures is required. Where practicable, SEQ-SPs preferred clearances will be as shown in Table 5.5 of the SEQ Water Supply Code and as defined in the separate SEQ Building Over Adjacent Assets document.

The property discharge line and boundary assemblies should be located away from driveways or potential driveways/accessways.

3.12.5 Crossings

Amend the reference to PSS 1002 and PSS 1003 to SEQ-PSS-1002-1 and SEQ-PSS-1003-1.

3.12.6 Marker posts

Where pipelines are located in remote areas or may be difficult to locate, marker posts, approved by Unitywater, shall be specified on the Design Drawings and installed adjacent to pipelines.

3.13 TRENCHLESS TECHNIQUES

Amend the dot points as follows:

a) Environmental, cultural and heritage ~~ly~~ sensitive areas;
b) built-up or congested areas to minimise disruption and reinstatement; ~~and~~
c) contaminated sites; and
d) other areas not suitable for trenching e.g. beneath buildings and overhead power lines.

Amend Table 3.1 as follows

TABLE 3.1
CLEARANCES BETWEEN PIPELINES AND OTHER UNDERGROUND SERVICES

Utility (Existing~~service~~ or proposed)	Minimum horizontal clearance mm		Minimum vertical clearance[1] mm
	Pipeline size NB		
	≤~~DN~~ 200 mm	>~~DN~~ 200 mm	
Drinking and non-drinking Water mains ~~≤ 375 mm~~	1000[2]	1000[2]	500[5]
~~Drinking and non-drinking Water mains > 375 mm~~	~~1000[2]~~	~~1000[2]~~	~~500[5]~~
Sewers ~~Gravity sewers ≤ 300 mm~~	300[3]	600	500[4,5]
~~Gravity sewers > 300 mm~~	~~300[3]~~	~~600~~	~~500[5]~~
~~Sewers – pressure~~	~~300[3]~~	~~600~~	~~500[5]~~
~~Sewers – vacuum~~	~~300[3]~~	~~600~~	~~500[5]~~
Gas mains	300[3]	600	500 ~~150~~
Telecommunication conduits and cables	300[3]	600	300 ~~150~~
Electricity conduits and cables	500	1000	500 ~~225~~
Stormwater pipes and drains ~~≤ 300 mm~~	300[3]	600	150[4]
~~Stormwater pipes and drains > 300 mm~~	~~300[3]~~	~~600~~	~~300~~
Kerbs	150	600[4]	150 (where possible ~~practicable~~)

NOTES:

1. *Vertical clearances apply when pipelines cross other utility services, except in the case of water mains when a vertical separation shall always be maintained, even when the pressure sewer and water main are parallel. The pressure sewer should always be located below the water main to minimise the possibility of backflow contamination in the event of a pressure main break.*
2. *For areas with existing water reticulation clearances can be further reduced to 600 mm with the approval of the water main Owner.*
3. *Clearances can be further reduced to 150 mm for distances up to 2 m when passing installations such as concrete bases for poles, pits and small structures, providing the structure is not destabilised in the process.*
4. Clearance from kerbs shall be measured from the nearest point of the kerb. For pressure sewers ≤~~DN~~ 375 mm clearances from kerbs can be progressively reduced until the minimum of 150 mm is reached for sewers ≤ ~~DN~~ 200 mm.
5. For pressure sewer laterals, minimum vertical clearances may be reduced to 150 mm provided there is no joint in the lateral within 500 mm of either side of the service being crossed.

3.14 DISUSED OR REDUNDANT PIPELINES

Amend (a) as follows:

(f) (a) Pipelines should not be designated ~~"abandoned".~~ *disused or redundant, advice from the Water Agency shall be sought for any additional requirements.*

Add (d) and (e) as follows:

(d) Where it is necessary to fill a disused or redundant pipeline, low strength grout (≤5 MPa) or similar material shall be used.

(e) Where AC pipelines are to be disused or made redundant, advice from the Water Agency shall be sought for any additional requirements.

3.15 SEWAGE QUALITY

3.15.1 Septicity

Insert the following text at the end of dot point (iii)

(Refer to Section 6.8 DISCHARGE MAINTENANCE HOLES)

Insert the following paragraphs at the end of the clause:

A web-based knowledge management system to make the findings of the research into corrosion and odour in sewer systems that have come from the ARC Sewer Corrosion and Odour Research (SCORe) Linkage Project (LPO882016) is readily available to the water industry.

The knowledge management system consists of:

(i). Fact sheets for each 8 individual research projects

(ii). Direct outputs from the SCORe Project including final reports, literature reviews, publications, case studies, etc.

The SCORe knowledge management system website is currently located at:

https://water360.com.au/projects/sewer-corrosion-and-odour-research-score-project/

3.15.3 Australian sewage quality management guidelines

The Australian Sewage Quality Management Guidelines are a framework for effectively managing sewage to a sewer system from its source, through its collection, transfer and treatment, to its disposal or reuse. By following the guidelines, Water Agencies can better manage loads and concentrations of inputs to the sewer system and achieve other benefits as well.

The guidelines assist Water Agencies in developing strategies that:

(a) promote the safety of workers and the public;

(b) manage sewage system assets;

(c) treat sewage effectively;

(d) meet environmental, cultural and heritage requirements; and

(e) recycle treated effluent and biosolids.

https://www.wsaa.asn.au/publication/australian-wastewater-quality-management-guidelines-2022

4.2 GRAVITY SEWERS

Amend the reference to WSA 02 in the clause as follows:

WSA 02 becomes SEQ Code edition of WSA 02

4.3 DESIGN INPUTS AND OUTPUTS

Amend dot point (e) as follows:

(e) The volume of sewage in each tank to be allowed for at the commencement of power outage recovery or in the case of dynamic modelling the time when the power outage began and the duration of the power outage. The volume in each tank at the time of power recovery, shall be based on the longest power outage in the previous five years (as provided by the relevant power authority) occurring during the peak property discharge period.

Where less than five years of records are available the designer shall determine an appropriate outage period based on available records and document the rationale for their determination.

4.4.1 Sanitary flows

Fundamental to the design of pressure sewer systems is the determination of sanitary flows which shall be determined in accordance with Clauses ~~2.3.1, 2.3.2, 2.3.3~~ 2.4.1. 2.4.2, 2.4.3 and Section 3 of SEQ Edition of WSA 02 and noted within this addendum.

4.4.3 Peak flows from homes and required pumping rates

Amend the second paragraph as follows:

~~In the Australian urban situation, the highest peak flows are most likely to occur from the pumped discharges from swimming pools when the filter is backwashed or the pool level after periods of rain is reduced to the correct skimmer box level. Peak flows of 4300 L over a 20 minute period or 3.6 L/s would not be unusual for the pump down of a full 9 x 4.5 m domestic swimming pool to the skimmer box working level.~~ For operational reasons, swimming pool discharges including backwash from either commercial or domestic pools shall not be discharged to the pressure sewerage reticulation system.

4.4.4.1 General

Add the following text and table at the end of paragraph 4:

For example, the following table may be used as a guide.

Number of grinder pumps connected	Number of grinder pumps operating simultaneously
1	1
2—3	2
4—9	3
10—18	4
19—30	5
31—50	6
51—80	7
81—113	8
[81+33(n)]—[113+33(n)]	8 + n

4.4.4.3 Design flow verification

Add the following text at the end of the section:

SEQ-SPs will not accept a design without the System Supplier's endorsement.

4.5.2 Minimum pipe sizes

Delete the first two paragraphs and insert the following in their place:

~~Property discharge lines shall be ≥DN 40 where one or two pumps are connected to any property discharge.~~

~~Pressure reticulation sewers shall be ≥DN 50 for residential, industrial and commercial zones unless Clause 4.5.3.4 requires a smaller size.~~

For single pressure sewer pumping units, the lateral and property discharge line sizes shall be DN 40 (OD).

For duplex pressure sewer pumping units, the lateral and property discharge line sizes shall be DN 50 (OD).

Pressure reticulation sewers shall be ≥ DN63 (OD) unless Clause 4.5.3.4 requires a smaller size.

4.5.3.1 General

Add the following at the end of the clause

For operational reasons SEQ-SPs has limited the sizes of PE100, PN16 pipe to DN 40, 50, 63, 90, 125, 180, 250, 315 and 355.

5.1.3 Location of network system

Add the following additional requirements as the last paragraph of this clause:

The reticulation pressure sewers shall be located in the approved services corridor as specified by the relevant authority.

5.1.4 Alignment of pressure sewers

Add a dot point (d) as follows:

(d) located to avoid 90º bends where possible. Alternatives to 90º bends include bending pipe (in the case of smaller diameters) and the use of 2 No. 45º bends with a minimum of 300mm between bends.

Amend (iii) as follows:

(iii) Refer to Clause 3.7 for any easement requirements. ~~Need for easements if required by the Water Agency (Refer to Appendix B)~~.

5.1.7 Bends

Reticulation pressure sewers will achieve any bend greater than 45 degrees by use of multiple bends (i.e. two 45 degree bends instead of one 90 degree bend) or a long radius bend with a minimum radius for cold bending as per POP202. Bends are not to be achieved by using multiple butt welds.

5.2.1 Profile design

Add the following after the first paragraph:

Pipework shall generally be laid at minimum depth. However, depths and pipe alignment shall be engineered to ensure that the system remains fully pressurised at all times, siphoning is prevented, and the requirement for air valves is minimised. Designer shall consider multi-catchment PSS system layouts or alternative hydraulic control systems (e.g. barometric loops) to avoid drain down sections of pipework.

5.3.1 Valves design

Replace the word "reflux" with "non-return"

5.3.4 Installation

Typical valve installation and chamber details are shown in Standard Drawing SEQ-PSS-1005-1.

5.4 ISOLATION VALVES

5.4.1 General

~~Isolation valves on pressure sewers shall be minimum PN 16 and clockwise closing.~~

~~The waterway of isolation valves shall be at least 90% of the pipe internal diameter.~~

~~Isolation valves ≥DN 80 shall be flanged or restrained-joint socketed resilient seated gate valves complying with WSA PS-260. Isolation valves <DN 80 shall be resilient seated ball valves complying with WSA PS-274.~~ Isolation valves ≥ DN80 shall be resilient seated gate valves. Isolation valves < DN80 shall be ball valves.

~~NOTE: If valves are not flanged or restrained-joint socketed, anchorage of valves ≥DN 80 shall be provided.~~

Flanges for joints PE pipes and fittings shall be supplied by the pipe manufacturer to suit the class of pipe. Flanges shall be butt fusion welded to pipes and each shall be supplied complete with loose stainless steel backing flange drilled to AS 4087 Figure B7.

Flange gaskets shall be 3mm minimum thickness full face NBR or EPDM rubber with a Durometer hardness of 55-57 complying with WSA 109.

5.4.2 Isolation valve locations

Replace item (a) with the following:

(a)The maximum spacing of isolation valves on reticulation mains shall be

a. 200 m for DN 100 and 150 mains;
b. 300 m for DN 200, DN 250 and DN 300 mains.

Add additional items after item (c):

(d) at the end of the Lateral immediately adjacent to pressure sewer mains, where the property service connection crosses a roadway, to isolate the section of property service connection across the road from the Service Provider network;

(e) at the end of the Lateral immediately outside the property being serviced. This Property Isolation Valve services as the connection between the Property Discharge Line (including boundary kit) and the Lateral. Refer to Standard Drawing SEQ-PSS-1101-1;

(f) at each incoming reticulation pressure main branch, i.e. at Tee's excluding property laterals;

(g) immediately upstream of the discharge MH at the connection to the gravity sewer; ~~and~~

(h) at other positions on the network pressure mains to provide operational flexibility for system operation, repair, line flushing and the like; and

(i) one upstream and one downstream of scour valves, when the system volume between scour points exceeds 9m

These requirements will necessitate the installation of two isolation valves where a property service connection crosses a roadway.

5.4.3 Isolation valve covers and surrounds

Add the following sentence at the end of the clause:

Traffolyte tags shall be installed on the underside of the surface fitting covers and be affixed with a secure fastener.

5.5 VACUUM GAS ~~AIR~~ RELEASE AND VACUUM BREAK VALVES

Replace the word "air" with "gas" in the title and body of this clause (and sub-clauses).

5.5.1 Installation design criteria

Change the first paragraph from informative text to normal and delete the note:

Pressure sewers with profiles that lead to gas ~~air~~ accumulation may require gas ~~air~~ release and vacuum break valves to automatically remove accumulated gas ~~air~~ that may otherwise cause operational problems in the system and to prevent a potentially destructive vacuum forming (Refer *Appendix A*).

~~*NOTE: Air also includes sewer gases.*~~

Replace the reference to Standard Drawings PSS-1006 with SEQ-SPS-1605-1 (applicable to QUU only) and SEQ-SPS-1606-1 (applicable to GCCC, LCC, RCC and UW)

Insert the following additional requirement at the end of this clause:

Sufficient distance will be needed between the discharge inert of the gas ~~air~~ release valve and the soffit of the pressure sewer depending on the height of the valve specified.

The Designer is to ensure that air release valves have a minimum 2 metres sealing pressure at the valve at all times.

Equal tees of the same DN as the pressure sewer shall be provided to allow air in the main to collect at the point where the air release valve is fitted. A flange plate shall be connected to the tee and its centre drilled to suit the size of air valve assembly.

Manual or automatic gas release/anti vacuum valves shall be located at parts of the main where the designer considers gas may accumulate over time. However, the design shall ensure that where possible the pressure sewer is designed to avoid the use of gas valves. Gas valve shall be located in pits with appropriate covers as shown in drawings SEQ-SPS-1605-1 (applicable to QUU only) and SEQ-SPS-1606-1 (applicable to GCCC, LCC, RCC and UW).

In circumstances where gas accumulation will cause significant impact on the system hydraulics, an automatic gas release valve which suits sewerage system is to be installed. The designer is to determine where this situation occurs and take into account the following factors:

(a) proximity to properties,

(b) venting requirements and subsequent odour issues,

(c) aesthetics of vent, and

(d) additional depth of cover required to install a gas valve.

Detail provided on separate drawings as follows:

- Manual Valving – Standard Drawing SEQ-SPS-1605-1
- Automatic Valving – Standard Drawing SEQ-SPS-1606-1

5.5.2 Types

***Insert a new first paragraph*:**

Gas release/vacuum break valves shall be of the automatic type. Manual gas valves are subject to Unitywater approval and will only be considered for instances where the need for the automatic release of gas from the system is considered low, or if the valve is specifically for gas movement associated with pipe filling/draining activities.

***Insert the following prior to the last sentence*:**

Flushing points shall not be used for the release of gas from a pressure sewer system, except for the application of draining a section of line.

5.5.4 Locations

Insert the following additional requirement at the end of this clause:

In addition to the above, the following factors are to be considered in the placement of automatic air valves:

a) proximity to properties

b) venting requirements and the potential odour impact on the surrounding residents (both existing and potential future residents)

c) aesthetics and safety requirements of any odour control infrastructure required, including any venting or carbon odour filters

d) potential visual impact on the surrounding residents (both existing and potential future residents)

Depending on the potential for nuisance odours, odour control facilities may include:

(i) a carbon canister, or

(ii) a vent shaft, or

(iii) a carbon canister and vent shaft

5.5.5 Chambers

Adjust the first sentence as follows:

Air release and vacuum break valves shall be located in covered concrete chambers, HDPE chambers or above-ground cabinets so as to provide adequate clearances for servicing/replacement of the valves.

Replace the last paragraph with:

Refer to Drawings SEQ-SPS-1605-1 (applicable to QUU only) and SEQ-SPS-1606-1 (applicable to GCCC, LCC, RCC and UW) for the typical chamber.

5.6.2 Flushing points and scours

Replace the first two sentences with:

All dead ends of a pressure sewer branches shall be provided with an end flushing point, regardless of the number of connections on the branch.

All flushing point connections to the main shall be via side mounted (not top) 45 degree 'Y' junctions with double isolation as indicated on drawing PSS-1007.

~~A flushing point shall consist of a tee (in-line) or 90° bend (end-of-line), a sampling valve located on a vertical riser and an isolation valve with a quick connection coupling, all located within a covered pit.~~

~~All dead ends to pressure sewers shall be provided with an end flushing point where the number of connections on a branch line exceeds five (5).~~ All dead ends to pressure sewers shall be provided with an end flushing point.

Amend the distance in (b) to 200m and add the following two paragraphs:

(b) *at intervals not exceeding ~~500~~ 200 m.*

When locating flushing points, it's important to consider about how the mains will be flushed during the construction phase and whether the system will be connected in stages. Flushing points for temporary development scenarios should be positioned in a way that facilitates cleaning of the lines and reduces the chances of blockages and unpleasant odours.

Flushing fittings are to have Camlock connections and be sufficiently robust to avoid damage through normal operational use.

Add additional item (v) after item (iv):

(v) At high points for the manual release of air during maintenance activities if a dual orifice air is not provided.

Refer to Drawing SEQ-PSS-1007-1 for typical flushing point arrangements.

At the end of the clause add:

All flushing points shall be lockable.

5.7 FLOW METERS

Adjust the paragraph as follows:

Locations for flow meter installation shall be by arrangement between the Water Agency and the Designer at the time of design to suit proposed programs of system performance data collection.

As a minimum, flowmeters will be required at the connection of a pressure system to the downstream system (e.g. sewage pumping station, gravity maintenance hole or wastewater treatment facility). Consideration should also be given to locate flowmeters to monitor or control the system where more than 100 properties are connected to the pressure system or in areas with substantial (greater than 1.5 hectares) commercial or industrial properties.

The positioning of the flow meter shall

(a) consider the manufacturers recommended straight length of pipe upstream and downstream of the meter position

(b) graded to ensure there is no air trap and any other requirements specified by the manufacturer.

(c) consider the source of power supply, method of data capture and downloading, and any need for telemetry.

~~To measure total system flow, a flow meter shall be provided in the pressure sewer after the last branch connection and just prior to discharge into the downstream non-pressure infrastructure e.g. gravity sewer or sewage treatment plant.~~

Flow meters shall be of a electromagnetic flow type, located in a concrete chamber.

~~Other locations for flow meter installation shall be by arrangement between the Water Agency and the Designer at the time of design to suit proposed programs of system performance data collection.~~

Design of flow meter installations shall be in accordance with the manufacturer's design guidelines to achieve the required level of accuracy of flow measurement.

~~The flow meter located to measure total system flow shall be an electromagnetic type nominated by the Water Agency. Any non-permanent strategically located branch flow meter/s shall be a transit time type nominated by the Water Agency.~~

The proposed source of power supply, method of data capture and downloading, and need or otherwise for telemetry shall be nominated on the Design Drawings after consultation with the Water Agency.

5.8 DISCHARGE MAINTENANCE HOLES

The pressure sewer system shall connect to a dedicated gravity sewer discharge maintenance hole or pumping station inlet maintenance hole. The proposed discharge rate shall not exceed two-thirds of the capacity of the downstream gravity sewer. An emergency relief system shall be constructed from the gravity sewer or inlet maintenance hole as per WSA 02 Gravity Sewerage Code of Australia or WSA 04 – Sewage Pumping Station Code of Australia, respectively. The pressure sewer main shall discharge to the gravity sewer through a discharge MH in accordance with the details on Drawings SEQ-SPS-1406-1, SEQ-SPS-1406-2, SEQ-SPS-1406-3 and SEQ-SPS-1406-4.

The turbulent discharge of effluent from the pressure sewerage system into the downstream sewer system is to be avoided. Connection to the discharge maintenance hole is to be made by grading the incoming pipework over a sufficient distance (no less than 6m) and/or increasing the diameter of the pressure sewer so that the flow does not become turbulent when transitioning to a gravity flow. No gravity connections other than the pressure main shall be made to the discharge maintenance hole, although provision may be made for future duplication of the pressure main where this is anticipated.

Drop inlets are not permitted without written permission from Water Agency.

A vent shaft shall be constructed at discharge maintenance holes where the diameter of the incoming pressure sewer is DN75 or larger. Vent shafts shall have a diameter equal to the diameter of the outgoing gravity sewer they ventilate, up to a maximum vent size of DN 300. The vent shall be in accordance with the requirements of clause 7.5.2 of WSA-02 Sewerage Code of Australia – Sydney Water Edition 2017 V4.

The discharge maintenance hole (including underside of cover) and downstream two maintenance holes shall be lined with a protective surface coating complying with WSA 201 Manual for Selection and Application of Protective Coatings and Sydney Water's Supplement to WSA 201.

The pressure sewer main shall discharge to the gravity sewer through a discharge MH in accordance with the details on Drawings SEQ-SPS-1406-1, SEQ-SPS-1406-2, SEQ-SPS-1406-3 and SEQ-SPS-1406-4.

Discharge MH's shall not be located on private property. Refer to Design Criteria for limitations on discharge to receiving sewers.

Discharge MH may not be required for a small pressure sewer system. Where pressure sewers directly discharge into gravity sewers, designer shall ensure the turbulence and sulphide generation potential to downstream gravity sewers meet the Odour Control requirements of Clause 2.9.

6.1.3 Design and construction policy

For development projects the developer is required to install all pressure sewer laterals and property isolation valves.

Property isolation valve is located on public side immediately outside the boundary of the private property being serviced. Property isolation valves serve to connect property boundary kits (private components) to pressure sewer laterals (public components). Refer to Drawing SEQ-PSS-1101-1 for a typical arrangement.

6.1 CLEARANCES

At the end of the clause add:

Minimum horizontal clearance between the property side boundary and any pressure sewer system component shall be at least 600mm for pipework and 1000mm for collection tanks as detailed in Drawings PSS-1150, PSS-1151 and PSS-1152.

Control panels, generator connection points (if any), isolation switches and pump units shall maintain the following clearances:

(a) Minimum 1.0 m to any natural gas meter; and

(b) Outside Gas Bottles Hazard Zones as shown in Table 7.1

TABLE 7.1

GAS BOTTLES HAZARD ZONES

	Exchange cylinder (mm)	In—situ fill cylinder (mm)
Horizontal Exclusion Zone from centreline to top cylinder valve	500	1500
Horizontal Exclusion Zone at ground level measures from centreline to top cylinder	1500	3500

6.2 VACANT LOTS

Remove references to Appendix B and Figure 6.1.

Replace the third paragraph with the following:

Residential vacant lots shall be provided with pressure sewer laterals at the time of construction of the reticulation system. The lateral shall be terminated at the property isolation valve and finished with a threaded cap. The property isolation valve shall be located immediately outside the front property boundary line.

The location of the property isolation valve shall be identified with detectable marking tape secured to the last fitting and terminated above ground.

Delete the last sentence of this clause.

Delete Figure 6.1.

6.3 EXISTING PROPERTY DATA COLLECTION

Add the following dot points at the end of the clause:

(q) Significant vegetation.

(r) Electrical distribution box material (potential for asbestos). If the electrical distribution box contains asbestos, an Asbestos Management Plan will be required for the site

6.6 CONTROL AND ALARM PANELS

Delete the first two paragraphs and insert the following:

The control panel shall be in a direct line-of-sight and within 10m of the collection tank. It is preferable that the panel is attached to the external wall of the main building on the property being serviced, close to the switchboard, and at a height of between 1.2m and 1.5m above the ground.

Where this is not possible, the control panel is to be mounted on a free-standing, fully galvanised post, located within 4 m from the centre of the collection tank and at a height between 1.2m and 1.5m. Control panels and their installation shall comply with the current requirements of AS/NZ 3000 Electrical Installations.

All gas bottle/hazard zones (including potential zones) shall be identified on Design Drawings and control panels shall not be permitted in these zones.

An IP56 rated, local lockable isolation switch shall be installed at a distance no greater than 300mm from the control panel.

General requirements for the layout of the control panel and electricals with respect to the collection tank are shown on drawing PSS-1101. Typical details for a free-standing control panel mounting post are shown in Drawing PSS-1156.

All control panels shall contain pump protection features as follows:

a) Shut pump off due to high pressure

b) Pump shut-off head to be adjustable

c) Limit continuous pump run time to 15mins (approx. 1 day's usage) (adjustable function) and switch off pump for 45mins (adjustable function) before pump start

d) Shut pump off after three consecutive ’15 minute run cycles’ in a 3 hour period and raise critical alarm

e) Limit the maximum number of pump starts to 10 per hour

f) Capable of operating via a level transducer and redundant high level float switch.

Insert the following additional requirements at the end of this clause:

All control/alarm panels shall have an emergency generator connection point.

All control/alarm panels shall be clear of 1-in-100 year flood level as advised by relevant local authority.

The visible and audible alarm shall be activated on pump fault and collection tank high-level.

7.1 GENERAL DESIGN REQUIREMENTS

At the end of the clause add:

Design of collection/pump units is the responsibility of the on-property designer.

The designer shall certify, to Council Plumbing Section, that the work have been designed and installed to approved plan and manufacture’s specification to ensure that the system will perform satisfactorily. Collection/pump units must be sized to ensure that their operation does not overwhelm or compromise the system (new and existing) in any way.

Retrofitting of septic tanks as collection tanks is not permitted.

7.2 EMERGENCY STORAGE

7.2.1 General

Remove the reference to Appendix B. Insert the following requirement at the end of the first paragraph of this clause:

Where required the emergency storage volume shall be the volume contained in the collection tank and incoming gravity sanitary sewer from the high level alarm to the lowest ground level at any point of system relief (e.g. overflow relief gully, collection tank vent). A minimum emergency storage of 24 hours will be required for residential properties.

7.3 LOCATION

Replace the second paragraph with the following:

Collection tanks shall be within 5m of the front (main) access property boundary, refer drawings PSS-1150 and PSS- 1151.

Where the ground level of the tank is higher than the dwelling being drained, and the tanks emergency storage volume is reduced then a riser or larger tank is to be used to ensure adequate emergency storage.

Where location of the collection tank in the front is not practical, the Designer shall consult with Water Agency and demonstrate why the collection tank needs to be located at the rear of the lot. The Designer is expected to consider regrading of land and the use of terraced lots to overcome this problem.

For low density dwellings (not including granny flats) with individual land titles, separate tanks will be provided for each dwelling. Low density dwellings include duplex, triplex or terrace style dwellings but not townhouse developments.

Delete the last paragraph in the clause.

7.4 MAXIMUM FLOWS TO COLLECTION/PUMP UNITS

Add to the end of the clause:

For operational and hydraulic reasons, flow, backwash or other discharge from a pool or spa shall not be connected to a collection/pump unit and then into reticulation system.

7.5 FLOTATION

Adjust the clause as follows:

Empty collection tanks shall be designed to prevent floatation with a safety factor of at least 1.5. ~~Empty collection tanks shall be designed to prevent floatation~~. Design calculations shall be based on the ground water level being at FSL.

This may be achieved with a concrete ballast. Concrete anchor ballast must extend minimum 180mm above the base of tank, or as per manufacturer's specifications (whichever is higher) to achieve the safety factor.

7.6 COVERS AND FRAMES

In the first sentence amend 150mm to 300mm

At the end of the first sentence add:

Collection tanks shall not be in flood prone areas, overland drainage paths or in areas which are prone to local flooding, without the Approval of the Water Agency.

Add the following paragraph after the second paragraph:

Provide ventilation (through the lid) so that sewage can fill to the top of the tank and empty without causing pressure build- up or suction in the tank. The tank lid shall be orientated to ensure the vent is located on the low side of any slope to prevent water from entering the tank. If not possible, the supplied tank vent shall be sealed and a new vent point shall be positioned near the top of the tank sidewall with a vent pipe routed to the building wall and up to a vent point above the existing roofline, in accordance with AS3500.

7.7 CONNECTION TO CUSTOMER SANITARY DRAIN

Replace reference to Standard Drawing PSS-1101 with SEQ-PSS-1101-1.
Delete the last paragraph.

7.8 GRINDER PUMP ~~IDENTIFICATION~~

Delete the word identification from the clause title.

Add the following subclauses:

7.8.1 General

As pump unit wear is partially related to the operating pressure of the pump unit, the maximum design head for each pump shall be no more than 75% of the manufacturers' recommended maximum normal operating pressure under dry weather. No pump shall operate for more than 15min continuously or 30min total in any one day.

Chemicals in industrial/trade waste may adversely affect the rubber stators in the pumps causing premature failure. When determining an appropriate pump for properties with potential industrial/trade waste, the Designer will need to consider the impact of this waste on the pump.

7.8.2 Identification

Pump identification shall be in accordance with Water Agency requirements:

Each property serviced by Water Agency-owned pressure sewerage infrastructure shall be assigned with a unique serial number issued by the Water Agency. A label with this serial number shall be installed on the front cover or side of the control panel. The serial number shall also be recorded in the property installation information and Work-As-Constructed drawings.

8 SERVICE CONNECTION PIPE WORK

Include the following into this clause:

Design of service connection pipe work (not the lateral) is the responsibility of the on-property designer.

8.1 PROPERTY DISCHARGE LINE

Change the first paragraph from Informative text to normal text.

Alter the first sentence as follows:

The property discharge line shall connect the collection/pump unit to a property boundary assembly, which shall consist of a non-return valve, a maintenance fitting, fitted with pressure relief mechanism ~~(Optional)~~ and an isolation valve in that order.

Insert the following after the first paragraph:

The maximum distance of property discharge line from the tank to the property boundary assembly shall be 100m.

The property discharge line shall not cross on to any adjacent property or collect the discharge from any other property. Exceptions will be allowed where the property discharge line crosses a common area (owned jointly by properties served) such as townhouse developments.

The boundary assembly shall not be installed in trafficable areas and must be 1m minimum away from trafficable areas.

Property boundary assembly shall be within 600mm to 1000mm from side and front boundaries. For battle-axe lots, it must be close to the street.

Live connections of property discharge lines required after system commissioning shall be undertaken by appropriately qualified personnel in accordance with Water Agency's requirements.

8.2 LATERALS

Replace the second paragraph with the following:

A property isolation valve shall be installed immediately outside property boundary between laterals and property boundary kits.

Pressure sewer laterals shall only be directly connected to pressure reticulation sewer that are less than or equal to DN160. Where connection to a pressure reticulation sewer >DN160 is necessary, a separate smaller reticulation pressure reticulation sewer (rider main) will be required to reduce the need to shut off a large main if maintenance is required on laterals or boundary assembly.

Laterals crossing under a retaining wall shall be protected by a carrier pipe.

8.4 DEPTH OF PIPEWORK

Replace this clause with the following:

The minimum and maximum depths of service connection pipework shall be in accordance with Standard Drawing SEQ-PSS-1000-1.

9.2.2 Pipe cover

Replace the reference to Standard Drawing PSS 1000 with *SEQ-PSS-1000-1*.

9.2.3 Trench design

Replace the reference to Standard Drawing PSS 1000 and PSS–1001 with SEQ-PSS-1000-1 and SEQ-PSS-1001-1.

9.2.5 Pipe embedment

Replace the reference to Standard Drawing PSS 1000 with SEQ-PSS-1000-1.

9.2.6 Other structural design considerations

Amend the reference to WSA 06 in the second paragraph of the clause to SEQ Code edition of WSA 06

9.3 NEW CONNECTIONS TO EXISTING PRESSURE RETCULATION SEWER – NEW CLAUSE

9.3.1 GENERAL

The means of connecting to an existing pressure reticulation sewer shall be determined in consultation with the Water Agency.

The means of connection, requirements and instructions for the connection, including shutdown requirements, shall be detailed on the Design Drawings and Specification.

In specifying connection detail, the design shall address:

(a) Pipe material requirements and limitations.

(b) Relative depth of mains.

(c) Standard valves and fittings.

(d) Pipe restraint and anchorage.

(e) Potential for insufficiently restrained/anchored stop valves near the connection.

(f) Limitations on shutting down major pressure reticulation sewer to enable connections.

(g) Ease of maintenance.

9.3.2 UNDER PRESSURE CUT-IN CONNECTION

Under pressure cut-in connections shall be in accordance with Drawings WAT-1102, WAT-1103 and WAT-1105

9.3.3 INSERTED TEE METHOD

Inserted tee method shall be in accordance with Drawings WAT-1102, WAT-1103 and WAT-1105. The first valve shall be no deeper than 1.5 m cover.

Connections from the end of a pressure reticulation sewer shall be designed to address any differing requirements for the pipes being connected.

PART 2 PRODUCTS AND MATERIALS

10.2 SCOPE

Replace the text of the whole clause with the following:

Design Drawings and specifications shall state requirements for pipeline component products and other construction items and materials such as embedment, trench fill, marking tapes etc. and the corresponding product specifications.

Water Agencies may require products and materials to be "approved" and/or product and material suppliers to be "accredited" and may have limitations on use of some products.

Unless otherwise permitted by the Water Agency, only Water Agency "approved" products and materials shall be used. Details of Agencies' approved products and materials may be obtained from their respective websites.

Where Water Agencies do not provide details of "approved" products and materials, Designers should include Product Specifications in project specifications to ensure that constructors purchase and install the correct products. Product Specifications should nominate any known Water Agency-specific requirements.

Product Specifications are listed on the WSAA website. Additional specifications may at times be added and existing specifications may at times be changed. Water Agencies may have additional, fewer or modified specifications listed on their websites that take precedence.

10.3.4 Purchaser

Replace the text with the following:

Constructors should use only such products that are nominated in the Specification and Design Drawings.

10.4 ~~PRODUCT AND MATERIAL STANDARDS AND SPECIFICATIONS~~ SELECTION GUIDE FOR PIPELINE SYSTEMS

Replace the text & tables of the whole clause with the following:

The WSAA Product and Material Information and Guidance materials (WSA-402 and WSA 403 Part 1) contains information on the principal pipeline system attributes and some details of ancillary products used in the construction of sewerage infrastructure and referenced in Pressure Sewer Code of Australia WSA 07, and this addendum to WSA 07 (Pr11337). They outline aspects such as product specifications, product descriptions and classifications, joint types, water industry experience and recommendations on use.

WSA 402 and WSA 403 Part 2 provides information on the applicability and limitations of the various quality assurance options. The information is not intended for use in a contractual sense but serves as a guide to specifiers, Designers, Constructors, and other interested parties.

It does not provide instructions on life expectancy for pipeline systems as this is dependent upon design, manufacture, transport, handling, installation, operation, protection from third party damage and other external factors. WSAA Product and Material Information and Guidance materials (WSA 402 and WSA 402) has been published in an eBook format. A PDF copy of the WSA 402 and WSA 403 can be downloaded directly from this eBook.

Please note that in order for the link to Product and Material Information and Guidance materials (WSA 402 and WSA 403) to function properly within this Code, Users must have purchased and checked out the WSA 402 and WSA 403 eBooks from the WSAA Shop.

When in doubt, specialist advice should be obtained, including from the pipe manufacturer.

10.5 ~~Quality Assurance~~ Identification Of Sewer Systems

Replace the text of the whole clause with the following:

The principal means of identification of sewers include one or more of the following:

i) Pipes of specific colours.

ii) Identification printed on pipes and/or sleeving.

iii) Use of marking tapes.

iv) Marking of surface fittings (Refer to clause 5.1.6 Location markers).

v) Identification markers and marker posts.

A summary of colour identification measures for reticulation sewers, property connection sewers and pressure reticulation sewers, pressure sewer laterals and property discharge lines are given in **Table 10.5**.

Colour identification for branch, trunk, main sewers and pressure reticulation mains (generally >DN 300) should be specified on project-specific basis, subject to limitations on available product options, augmented by marking and process controls.

TABLE 10.5 COLOUR IDENTIFICATION OF COMPONENTS IN RETICULATION SEWER SYSTEMS

COMPONENT		GRAVITY SEWERS/SANITARY	PRESSURISE SEWERS[1,8]
RETICULATION GRAVITY SEWERS/PRESSURE RETICULATION SEWERS ≤DN 300			
Pipe	Ductile Iron	Red external coating [2,4] with grey PE sleeving	Red external coating[2,4,10] with Cream PE sleeving
	PE[11]	Grey, or black with grey stripes or grey jackets[9]	Cream, or black with cream stripes or cream jackets
	PE[13]	Black	N/A
	PP[13]	Grey[9]	N/A
	PVC U[14]	Grey	N/A
	PVC M[15]	N/A	Cream
	PVC O[15]		

	PVC U[15]		
	PVC U[16]	N/A	Cream
	VC	Natural brown	N/A
	GRP	Beige [5]	Beige [5]
Fitting	DI	Colour not required [3,4]	Colour not required [3,4]
	PE[12]	Black, grey, or black with grey stripes or grey jackets	Black, cream, or black with cream stripes or cream jackets
	PE[13]	Black	N/A
	PP[13]	Grey[5,9]	N/A
	PVC U[14]	Grey	N/A
	PVC M[15]	N/A	DI fittings, Colour not required [3,4]
	PVC O[15]		
	PVC U[15]		
	PVC U[16]	N/A	Cream
	VC	Natural brown	N/A
	GRP	Beige[5]	Beige[5]
Valve (spindle cap, handle)		N/A	Cream coating
Valve (body)		N/A	Colour not required [4]
Scours (outlets)		N/A	Cream coating
Marking tapes		Grey	Cream
Surface fittings and surrounds		Note 7	Note 7
Signage (marker posts, plates etc.)		Note 7	Note 7
GRAVITY PROPERTY CONNECTION SEWERS[1,8] / PRESSURE SEWER LATERAL & PROPERTY DISCHARGE LINE			
Pipe	DI	Red external coating [2,4] with Cream PE or grey sleeving	Red external coating[2,4,10] with a Cream or grey PE sleeving
	PE[12]	Grey, or black with grey stripes or grey jackets[8]	Cream, or black with cream stripes or cream jackets
	PE[13]	Black	N/A
	PP[13]	Grey[9]	N/A
	PVC U[14]	Grey	N/A
	PVC M[15]	N/A	

	PVC O[15]		
	PVC U[15] (Series 2)		
	PVC U[16] (series 1)	N/A	Cream
	VC	Natural brown	N/A
	GRP	Beige[5]	Beige[5]
Fittings	DI	Colour not required [3,4]	Colour not required [3,4]
	PE[12]	Black, grey, or black with grey stripes or grey jackets	Black, cream, or black with cream stripes or cream jackets
	PE[13]	Black	N/A
	PP[13]	Grey[9]	N/A
	PVC U[14]	Grey	N/A
	PVC M[15]	N/A	DI fittings[3,4]
	PVC O[15]		
	PVC M[15]		
	PVC U[16] (Series 1)	N/A	Cream
	VC	Natural brown	N/A
	GRP	Beige[5]	Beige[5]

1. Includes pressure and vacuum sewers and pressure (rising) mains.
2. DI pipe coatings in accordance with AS/NZS 2280. A polyurethane coating or an epoxy finishing layer coloured red for pipes with CAC cement mortar lining.
3. DI fittings shall be thermal-bonded polymeric coating in accordance with AS/NZS 4158
4. Where PE sleeving is specified, the colour shall be cream for pressure sewerage applications or grey for non-pressure sewerage applications.
5. Depending on the resin used for specific applications, may be slightly greener.
6. Some Water Agencies may require colour differentiation to be provided.
7. To be coloured in accordance with Unitywater requirements.
8. Includes pressure laterals and property discharge lines.
9. If condition assessment using CCTV inspection is anticipated, then use grey or cream or black with cream stripes or jackets with a co-extruded internal white, light grey, orange, yellow or green liner.
10. Colour coding of pipe classes

    PN: Socket End

    20: Green

    35: Red

    FLCL: White

11. Polyethylene pipe manufactured to AS/NZS 4130 and the relevant WSA Product Specifications.
12. Polyethylene fitting manufactured to AS/NZS 4129 and the relevant WSA Product Specifications.

13. Polyethylene and Polypropylene pipe and fittings manufactured to AS/NZS 5065 and the relevant WSA Product Specifications.
14. PVC-U pipes for sewer, drain waste and vent applications manufactured to AS/NZS 1260 and the relevant WSA Product Specifications.
15. PVC-M, PVC-O and PVC-U (Series 2) pipes for pressure applications manufactured AS/NZS 4765, AS/NZS 4441 and AS/NZS 1477 and the relevant WSA Product Specifications.
16. PVC-U (Series1) pipes for pressure applications manufactured AS/NZS 1477 and the relevant WSA Product Specifications.

10.6 COLLECTION TANK/PUMP UNITS

10.6.1 General

Add the following additional requirement as a second paragraph:

Where Pressure Sewerage Systems are the means of Reticulated Sewerage for a property, the on-lot components of the Pressure Sewerage System shall comply with the requirements of SEQ-WSA-07. The Plumbing Application shall be made with the specific components defined so that the SEQ Water Service Provider can review and advise the Council Plumbing Department of the compliance or not of the proposal.

Add the following as the last paragraphs:

The pump system supplier shall provide a pre-assembled package of the low pressure sewer on-property components, including pumps, collection tanks, associated piping and valves, liquid level sensors, electrical control panel, electrical distribution box, and all other associated components. Pump motors shall be continuous rated, IP68 electrical rating.

A pre-assembled package has distinct advantages that the assembly has been refined, as dictated by previous experience. The pre-assembled package also provides a single source of responsibility in the event of malfunction, and for component replacements.

The pump system supplier shall provide the property owner with an owner's manual which includes a service and maintenance plan covering civil, electrical and mechanical assets along with design specification and as installed / constructed plans.

10.6.2.1 General

Replace WSA PS-401 with WSA PS–401 GRINDER PUMPS AND RELATED COMPONENTS FOR PRESSURE SEWERAGE.

10.6.3 Collection tanks

Replace WSA PS-402 with WSA PS–402 COLLECTION TANKS FOR PRESSURE AND VACUUM SEWERAGE.

10.7.2 Polyethylene (PE) pipes and fittings

Adjust the clause as follows:

10.7.2.1 Product Specifications

PE pipes and fittings shall comply with AS/NZS 4129 and AS/NZS 4130.

WSA PS – 207 POLYETHYLENE (PE) PIPES FOR PRESSURE APPLICATIONS - DRINKING WATER, NON-DRINKING WATER SUPPLY AND SEWERAGE

WSA PS – 208 PLASTICS MOULDED FITTINGS FOR PRESSURE APPLICATIONS WITH PE PIPE – DRINKING WATER, NON-DRINKING WATER SUPPLY AND SEWERAGE

NOTE: Product Specifications are listed on the WSAA website. Additional specifications may at times be added and existing specifications may at times be changed. Water Agencies may have additional, fewer or modified specifications listed on their websites that take precedence.

10.7.2.2 Sizes and configurations

The nominal diameter, pipe pressure classification, material class (PE100), length and form of pipes (straight lengths or coils), types, materials and classes of fittings shall be detailed in the Design Drawings and/or Specifications.

The means of tapping the existing pressure reticulation sewer shall also be detailed in the Design Drawings and/or Specification noting that:

Where tapping is specified for PE pressure sewer laterals use authorised electrofusion tapping saddle complying with WSA PS–329.

DN 40, 50, 63, ~~75~~, 90, ~~110~~, 125, ~~140, 160,~~ 180, ~~200~~, 250, ~~280~~ ~~and~~ 315 and 355 PE100 pipes and fittings suitable for jointing with electrofusion fittings or butt fusion welding shall be used for pressure sewers, laterals and property discharge lines. De-beading is not to be carried out for butt welding joints unless otherwise specified by SEQ-SPs

A mechanical/ rotational scraper shall be used to remove oxidised layers during electro-fusion joint preparation. The use of hand scrapers is not permitted

Mechanical fittings with end thrust restraint may be used where welding is not practicable.

The minimum pressure classification of pipes and fittings shall be PN 16.

~~*As at October 2005, readily available sizes of PN 16 PE80B or PE100 pipe and compatible electrofusion fittings are DN 40, 50, 63, 90, 110, 125, 180, 250 and 315.*~~ *For operational reasons SEQ-SPs has limited the sizes of PE100, PN16 pipe within its pressure sewer systems to DN 40, 50, 63, 90, 125,180, 250, 315 and 355*

Mean internal pipe diameters for PE pipes are given in Table 10.2

TABLE 10.2 INTERNAL DIAMETERS OF PE PIPES TO AS/NZS 4130

PIPE SIZE DN	MAXIMUM MEAN INTERNAL DIAMETERS [1]
	PE100 SDR 111PN16
40	34
50	43.1
63	54.2
75	64.7
90	77.7
110	94.8
125	107.8

PIPE SIZE DN	MAXIMUM MEAN INTERNAL DIAMETERS [1]
	PE100 SDR 111PN16
140	120.7
160	137.9
180	155.1
200	172.4
225	193.9
250	215.5
280	241.4
315	271.5

NOTE 1 Maximum Mean ID values in Table 5.2 for PE pipe were calculated from the values for maximum outside diameter and minimum wall thickness as specified in AS/NZS 4130:2018.

10.7.5.1 Product Specifications

PVC pipes shall be PVC-M or PVC-U complying with WSA PS–209S and WSA PS–211S respectively. Fittings shall be PVC-U complying with WSA PS–213S.

NOTE Product Specifications are listed on the WSAA website. Additional specifications may at times be added and existing specifications may at times be changed. Water Agencies may have additional, fewer or modified specifications listed on their websites that take precedence.

10.7.5.2 Sizes and configurations

DN 32, 40 and 50 Series 1 PVC pipes and fittings suitable for solvent cement jointing may be used for pipework within collection tanks.

~~PVC pipes shall be PVC-M or PVC-U complying with WSA PS–209S and WSA PS–211S respectively. Fittings shall be PVC-U complying with WSA PS–213S~~.

The minimum classification of pipes and fittings shall be PN 16.

10.8 EFFECT OF CHEMICALS

Change the text in the first paragraph to normative text

10.10 ~~ADDITIONAL PRODUCT AND MATERIAL INFORMATION – DELETE~~

PART 3 CONSTRUCTION

11.2 INTERPRETATION

Delete the first paragraph.

Amend the following paragraph:

"**Product ~~Purchase~~ Specification**" means the WSAA Product ~~Purchase~~ Specification detailing the requirements for the supply of a product or material.

Add the following definition in alphabetical order:

"Recognised Testing Laboratory" means a laboratory competent to conduct applicable product tests and:

(i) accredited by the National Association of Testing Authorities (NATA) having a scope of accreditation covering the testing requirements of the applicable specification(s);

or

(ii) accredited by an International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) signatory and having a scope of accreditation covering the testing requirements of the applicable specification(s);

or

(iii) recognised by the Water Agency following evaluation of the laboratory's compliance with the applicable requirements of ISO/IEC 17025.

12.2 PERSONNEL QUALIFICATIONS

After the second paragraph add the following:

Personnel carrying out or supervising the installation of pressure sewer shall hold minimum qualifications as required by AS2033 Installation of Polyethylene Pipe Systems. The minimum PE accreditation is PMBWELD301B and PMBWELD302B. On-property works are Regulated Plumbing and shall be carried out by a Licensed Person.

13.1 GENERAL

Add the following paragraphs at the start of the clause

Consult with the Designer to ascertain the results of the "all hazards risk assessment" and the control measures required to be undertaken to address each risk and/or hazard prior to commencement of works and/or during construction.

Do not commence work until detailed Specifications and "Construction Issue" Design Drawings are available.

Prior to commencing construction in filled areas, mine subsidence areas, potentially unstable (slip) areas, areas containing acid sulphate soils and/or areas affected by salinity and any areas of concern to construction, consult the Designer to confirm special requirements.

Delete the last paragraph

13.3 CONTRACT INTERFACES

Amend the first sentence as follows:

Adopt the contract interfaces as indicated on the Design Drawings and/or Specification. ~~The Contract Interfaces shall be as indicated on the Design Drawings and/or Specification.~~

13.4.2 Resolution of complaints

Delete the last paragraph of the clause.

13.5.1 Safety of people

***Replace the whole sixth paragraph with*:**

Adhere at all times to the Queensland Works Health and Safety Act 2011 (WHS Act) and the Work Health and Safety Regulation 2011 (WHS Regulation).

13.5.2 Protection of other services

Add at the start of the clause:

The Developer or its Constructor/s shall be responsible for any damage they cause to existing services. If the Developer or its constructor damages any existing services, they shall arrange for the relevant service authority to make good such damage and the cost thereof shall be borne by the Developer or its constructor. If in the opinion of the relevant SEQ-SP, the failure or damage causes an emergency situation, then remedial action will be taken by the relevant SEQ-SP and the full cost of such action shall be borne by the Developer or its Constructor.

***Amend the original first paragraph as follows*:**

Prior to excavation, contact *Dial Before You Dig* by visiting www.1100.com.au ~~email~~ or telephone 1100 to determine or reconfirm the location of underground services. Before work commences, ensure plans of all relevant services are available on site. Should information on Water Supply and Sewerage assets not be available from Dial Before You Dig, a direct application to the relevant Water Service Provider will be required.

Add dot point

(i) Prove the location of all underground services e.g. by potholing

13.5.3 Disused / Redundant sewers, drains and tanks

***Replace the Clause with*:**

The Contractor is responsible for any disused sewers as defined within the Contract Drawings.

It is the Owner's responsibility to take action regarding disused sanitary drains and septic tanks e.g. removal, filling, capping at points of disconnection and removing surface fittings as specified etc.

Disused/redundant drains and tanks are to be disposed off in accordance with local requirements as specified/approved by the relevant authority.

Remove surface fittings and demolish structures such as MHs and vent shafts to a minimum of 1 m below surface and fill with crushed rock or an approved material. Fill disused pipes with approved material.

Add new sub-clause as follows:

13.5.4.1Road opening permits - NEW

Obtain a road opening permit from the road Owner (e.g. Council) prior to commencement of any works within a road or road reserve.

Re-number existing subparagraph 13.5.4.1 Treatment of pavements and other surfaces to 13.5.4.2 Treatment of pavements and other surfaces

Delete existing subparagraph 13.5.4.2 Traffic Management

13.5.4.6 Private and public properties

Add to the start of the clause;

Generally, the Superintendent is responsible for negotiating any access that is necessary to actually construct the Works through private or public land

13.5.5.1 General

Adjust the clause as follows:

Take all necessary measures to protect the environment and heritage areas and comply with specific environmental management requirements identified in the project REF or EIS. In the absence of specific requirements being stated in the contract or development agreement, address relevant aspects of the general environmental management requirements of the Water Agency.

13.5.5.3 Protection of adjacent lands and vegetation

Amend the fifth paragraph:

Only remove or trim trees and shrubs if essential for the Works. Where specified;

(a) Treat all cut branches and roots with a suitable fungicide and/or

(b) Collect seeds from existing vegetation for use during restoration (Refer to Clause 23.5) and/or

(c) Employ a qualified bush regenerator to weed the Works area prior to commencement to prevent the spread of weeds during construction.

13.5.5.4 Control of water pollution

Add at the end of the clause:

In order to control water pollution and meet the emission limits for waste discharges to water specified in applicable Regulations and/or Policies of the relevant Regulator:

(i) Suggested practices may include, but are not limited to:

(A) Department of Conservation & Land Management, NSW “Urban Erosion and Sediment Control Handbook”, 1992.

(B) Department of Housing, NSW “Soil and Water Management for Urban Development”, January 1993.

(C) Department of Environment & Climate Change, NSW “Managing Urban Stormwater Soils and Construction Volume 2A Installation of Services”, January 2008.

(D) Environment Protection Authority (SA) “Code of Practice for Local, State and Federal Government”, November 1997, Revision 2:March 2009.

(E) Environment Protection Authority (Vic) “Construction Techniques for Sediment Pollution Control” Publication No. 275, May 1991.

(F) Environment Protection Authority (Vic) “Environmental Guidelines for Major Construction Sites” Publication No. 480, February 1996.

(G) Institution of Engineers, Australia, Queensland Division “Soil Erosion and Sediment Control”, June 1996.

(H) RTA (NSW) “Road Design Guide”, Section 8 – Erosion and Sedimentation, April 1993.

(I) Vic Roads “Road Design Guidelines”, Part 7.6 Drainage, August 1996.

(ii) Ensure that the turbidity in receiving waters does not exceed environmental quality objectives as specified. To achieve this:

(A) Adequately plan, install and maintain the sediment control of the construction site and ensure that construction activities such as excavating and dewatering do not result in turbid water entering drainage networks.

(B) Implement daily monitoring of the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway.

(C) Supervise all pumping and implement precautions to minimise the turbidity of pumped water.

(iii) Adopt practices to ensure that turbid water does not enter the drainage systems.

Suggested practices may include, but are not limited to:

(A) Construction of detention basins and settling ponds particularly on larger sites.

(B) Discharge of silt laden waters onto vegetated areas of suitable size and slope to filter out suspended silts.

Where land is not available or suitable for settling ponds and/or vegetated filter strips, then silt laden water may need to be subject to a specifically designed physical filtration and/or chemical flocculation system to remove suspended silts.

(iv) Consult the Superintendent for endorsement of the proposed options prior to commencing construction.

Suggested options/methods that the Constructor may use to achieve the measures are as follows:

(A) Hessian bags (sausages) filled with crushed rock laid across gutters in series as required.

(B) Temporary culvert/side entry pit entry consisting of planks of timber around culverts/side entry pits with either geotextile filter fabric or gravel behind timber or both to allow water to pass through retaining the silt.

(C) Silt fences consisting of geotextile filter fabric reinforced with mesh and crushed rock.

(D) Side entry pits consisting of plugged side entry pits with discharge into pit and disposal at sites where other controls have been installed, which may require transportation of water off site.

(E) Site baffle tanks designed to manage the site flows.

These options/methods only represent a few of what are available and the Constructor may use others that exist. The Superintendent will need to approve any such options/methods that the Constructor decides to use.

(v) Maintain stockpiles of spoil and materials at a minimum and locate clear of footpaths and street channels.

Take necessary measures to prevent sediment from these stockpiles entering the drainage system.

Suggested practices could include, but are not limited to:

(A) Tarpaulins or plastics sheeting over the stockpiles.

(B) Storage bins.

(C) Use of timber toe boards around the stockpiles.

(vi) Use suitable methods on construction sites when dewatering and road cleaning/jetting.

Do not limit sediment control in residential streets to placement of hay bales.

If all known on-site treatment methods are unsuitable or impracticable, remove the turbid and silt laden water by tankers for treatment and disposal at an appropriate wastewater treatment facility.

Add new sub-clauses 13.5.5.7 & 13.5.5.8 as follows:

13.5.5.7 Fire ant areas

Fire ants are dangerous imported pests that could spread to large areas of Australia, severely damaging the environment, our outdoor lifestyle and agriculture and tourism industries. The national fire ant eradication program (NFAEP) is a national program funded by all Australian states and territories, as well as the federal government, and implemented by the Biosecurity Queensland.

Prior to work commencing, determine whether the Design Drawings indicate a fire ant restricted area. Where the works are within a fire ant restricted area, adhere to requirements of the relevant regulator and take appropriate measures during excavation, storage, transport and disposal of soil and filling of trench, to ensure that fire ants are treated

13.5.5.8 Equipment and machinery use in bush fire prone areas

On days of total fire ban, do not undertake operations such as cutting, grinding, welding, gas cutting and use of motorised machinery such as chainsaws.

Do not undertake any activity prescribed by the relevant Fire Service unless an exemption has been granted.

13.10 LATENT CONDITIONS

Add the following dot points:

(f) Contaminated soils.

(g) Inadequate clearances from other services.

(h) Sensitive environmental aspects.

14.1 GENERAL

Delete this subclause.

14.2 AUTHORISED PRODUCTS AND MATERIALS

Replace the first paragraph with:

Use only products and materials specified by the Specification or Design Drawings.

Replace the rest of the clause with:

Products and materials may be specified by name, type, class etc. if included on relevant Water Agency approved product lists or may be specified by reference to a WSAA Product Specification or alternative Water Agency approved specification. The Water Agency or its authorised representative may specify requirements and limitations relating to "innovative" and "special" products not listed as approved or covered by a WSAA Product Specification.

Use only products and materials authorised by the Water Agency and listed within the SEQ Infrastructure Products and Materials List.

Replace 14.2 REJECTED PRODUCTS AND MATERIALS with 14.2 DELIVERY INSPECTION OF PRODUCTS AND MATERIALS

14.3 ~~REJECTED PRODUCTS AND MATERIALS~~ DELIVERY INSPECTION OF PRODUCTS AND MATERIALS

Replace the wording in the clause with:

Inspect all products and materials at the time of delivery.

Quarantine any product or material not specified by the Specification or Design Drawings or not conforming to a Product Specification nominated by the Specification or Design Drawings. Consult the Designer regarding options and instructions for using such products that are not defective or damaged and appear to be fit for the intended purpose. Obtain written approval from the Designer to release for use any such products or materials, including any special requirements and/or limitations on use.

Otherwise reject unspecified or non-conforming products and materials that do not have written approval for use and arrange for prompt removal from site.

Quarantine and reject any defective products such as those that are damaged, excessively distorted, outside their "use-by" date, unmarked or incorrectly marked and including, but not limited to:

a) *Faded/discoloured plastics and/or plastics-coated pipes, fittings and other components.*

b) *Kinked or crushed plastics pipes.*

c) *PVC pipes and fittings scored deeper than 10% of the wall thickness to a maximum of 0.5 mm.*

d) *PE and PP pipes, fittings and other components scored deeper than 10% of wall thickness.*

e) *Electrofusion PE fittings not sealed in separate bags or cartons or with damaged sealed bags or cartons.*

f) *GRP pipes, fittings and other components scored deeper than 1 mm or with impact damage.*

g) *DI and steel pipes, fittings and other components with damage to linings in excess of 20% of the lining thickness.*

h) *Plastics-coated pipes, fittings and other components with damage to coating in excess of 20% of the coating thickness.*

i) *Faded / discoloured PE and plastic coated items and GRP/FRP tanks.*

j) *GRP/FRP tanks scored deeper than 2 mm or with impact damage.*

Indelibly mark or tag rejected products with wording such as "Do not use" or other identification and arrange for prompt removal from site.

Do not use any rejected products or materials in the Works.

Delete existing headings and text contained within 14.3 REJECTED PRODUCTS AND MATERIALS , 14.4 TRANSPORTATION, HANDLING AND STORAGE OF PRODUCTS AND MATERIALS and 14.5 DELIVERY INSPECTION OF PRODUCTS AND MATERIALS and

Replace with 14.3 TRANSPORTATION, HANDLING AND STORAGE OF PRODUCTS AND MATERIALS, 14.4 REJECTED PRODUCTS AND MATERIALS and 14.5 REJECTED PRODUCTS AND MATERIALS as follows:

14.4 TRANSPORTATION, HANDLING AND STORAGE OF PRODUCTS AND MATERIALS

14.3.1 General

Transport, handle and store all products and materials in accordance with the manufacturers' recommendations and in a manner that prevents damage or deterioration or excessive distortion.

NOTE REFER TO PIPA PO005 for further information on transport handling and storage

14.3.2 Transportation

Support and secure all items during transit using straps or other suitable means to prevent excessive distortion or movement. Where supports, restraints and packing bear on item surfaces, provide suitable protection to prevent point loading, chafing, scoring, shock and other damage during transport. Do not allow wire straps, wire ropes or chains to come into direct contact with items.

Limit the heights of stacks of items to minimise distortion during transport. Where nesting and stacking of items is permitted, provide appropriate protection measures.

Stack items with end treatments such as couplings on pipes so that the ends are free from loading and/or damage.

Do not transport plastics items in covered trailers or containers unless appropriate means of preventing heat entrapment is provided.

14.3.3 Unloading and handling

Ensure personnel involved in unloading and handling wear appropriate personal protection equipment.

Prevent damage to products during unloading and handling by:

a) ensuring the stability of the product stack, proposed unloading equipment and transportation vehicle;

b) unloading on even ground;

c) proper use of unloading equipment;

d) correct site storage.

e) Promptly identify and perform in-situ repair of thermal-bonded polymeric coating on fittings and valves using approved materials in accordance with manufacturer's *recommendations.*

14.3.4 On-site storage

Except for checking against the purchase order, keep pipe, fittings, seals and other components delivered within protective crating or packaging, until immediately prior to use.

Pay particular attention to the protection of product and material coatings and linings.

Stack all pipe in a manner that minimises pipe ovalisation.

Do not store PE pipe and fittings and plastic coated items near generators or other heat emitting equipment. Do not remove PE electrofusion fittings from sealed bags and/or cartons until just prior to installation. Do not store products under dark coloured (e.g. black) plastics sheeting or in any situation where the temperature may exceed 60°C.

Do not store non-black PE pipe and fittings and GRP/FRP tanks uncovered in direct sunlight for more than twelve (12) months. If storage periods are likely to exceed twelve (12) months, cover and store pipe in a manner that allows ventilation and prevents heat entrapment.

Keep the ends of PE pipe and fittings free of loading.

Use non-black PE pipe and fittings and GRP/FRP tanks within two (2) years of manufacture.

For pipe conforming to AS/NZS 4130, if the total storage period is likely to exceed 24 months, pipes and fittings shall be covered.

PE pipe, fitting for collection tanks that are not UV stabilised shall be stored indoors

Store elastomeric sealing rings, lip seals and gaskets away from sunlight and in an unstrained condition.

Electrofusion fittings shall be stored in their original packing. Joint lubricants shall be stored in sealed containers until ready for use.

Store large diameter pipes and fabrications, including collection tanks to preserve dimensional properties.

14.3.5 Coiled plastics pipe

Coils of pipe may be heavy and it must be remembered the coil is under tension . The amount of energy stored in the coil will depend on the size of pipe, the class of the pipe, and the size of the coil. The amount of energy can be substantial and cause significant injury, death or damage if released in an uncontrolled manner.

Coiled plastics pipe when removed from the coil or drum may be oval and curved. The extent of ovality and curvature will depend upon the ambient temperature, SDR, pipe diameter, coil diameter and compound type. Although both ovality and curvature may reduce naturally with time, special equipment is available to facilitate handling and jointing. Coiled pipe is usually limited to a maximum of DN 125.

Document coil handling and processing requirements using suitable coil handling and levelling equipment to reduce ovality and curvature to an acceptable level to achieve construction tolerances (Refer to 21 TOLERANCES ON AS-CONSTRUCTED WORK).

Validate documented procedures by undertaking a trial installation to demonstrate that coiled pipe can be installed to meet construction tolerances (Refer to 21 TOLERANCES ON AS-CONSTRUCTED WORK).

Additional information on storage, transport and handling of coiled PE pipes may be found in PIPA Guideline POP 005. In particular, attention is drawn to the dangers associated with stored energy in coiled pipes or those rolled on drums.

14.5 REJECTED PRODUCTS AND MATERIALS

Reject any damaged or defective products or materials.

Reject any unauthorised or unspecified products or materials unless written approval has been given for their use.

Do not use any rejected products or materials in the Works.

Place rejected products and materials in a quarantined area and arrange removal from the site at the earliest opportunity.

14.6 CONCRETE WORKS

Replace the text in 14.6 CONCRETE WORKS and its sub-clauses 14.6.1 Delivery to 14.6.10 Repair of Blemishes with the following:

Use premixed, normal class concrete to WSA PS-357 Concrete, Pre-Mixed Normal Class or special class to WSA PS-358 Concrete, Pre-Mixed Special Class as nominated in the Specification or on the Design Drawings.

Set out and install formwork for in-situ concrete structures to be plastics-lined so as to facilitate fixing of plastics-lining materials to internal formwork faces and in a manner that will:

a) Ensure intimate continuous contact of lining materials with the formwork.

b) Position fixing holes within areas of lining that will be subsequently covered by jointing or welding strips.

c) Avoid the securing of lining materials by means of bands or straps otherwise than as provided for in the lining material manufacturer's instructions.

Ensure concrete is delivered to site for use within 90 minutes of commencement of mixing at the batching plant.

Transport, handle, place and compact concrete so as to:

i) limit segregation or loss of materials;

ii) limit premature stiffening;

iii) produce a monolithic mass;

iv) completely fill formwork, expel entrapped air, and closely surround all reinforcement, tendons, ducts, anchorages and embedments; and

v) provide the necessary surface finishes.

14.7 SUPPLY OF WATER TO THE WORKS

Replace the text in the clause with the following:

Use non-drinking water for construction Works wherever practicable.

Where drawing water from hydrants and fireplugs, for purposes other than fire fighting, obtain a permit from the relevant Water Agency.

Due to the potential of contamination to the water supply system by backflow, fit a WaterMark certified testable backflow prevention device or air gap so as to be visible on the tanker (vehicle) at all times when drawing water from hydrants/fireplugs.

For drawing water from fireplugs and hydrants other than by water tanker, fit a WaterMark certified non-testable dual check valve.

Consult the Water Agency to confirm the availability of water supply during the construction period.

16.1 SAFETY

Delete the first paragraph.

Add the following at the end of the third paragraph:

in accordance with **13.5.1 Protection of other services**.

16.2 LIMITS OF EXCAVATION

At the end of the clause add:

Minimum trench widths and depths shall be in accordance with Standard Drawing SEQ_PSS-1000-1.

Where required, the Contractor must make an allowance for the widening of the trench at PE pipe weld locations and for concrete encasement.

Replace 16.4 EXCAVATION IN ROOT ZONES with 16.4 PROTECTION OF TREES as follows:

16.4 PROTECTION OF TREES

16.4.1 General precautions

Obtain approval from the Owner of the trees prior to excavation.

Avoid storing products and materials, including soil, rocks or gravel against trees or under tree canopies or above root zones.

Fence off trees to keep machinery away. Tie back stems and branches to keep them out of the path of machinery. Boring or hand excavation may be acceptable alternatives.

Carefully clean machinery between jobs to minimise the risk of soil-borne contamination between work sites. This is mandatory in areas where cinnamon fungus occurs.

16.4.2 Protection of roots

Take every precaution to ensure that no undue damage is caused to a tree root system as a result of excavation for the Works. Excavation for sewer construction by hand or by boring may be required to protect the root zone.

Cleanly cut all roots ≤60 mm diameter encountered during excavation.

Do not cut tree roots larger than 60 mm diameter without approval of the Superintendent.

Immediately trim back damaged roots or branches, including damage to bark, with a sharp saw to achieve a clean cut.

Apply an approved fungicide or mastic tar to reduce the likelihood of infection as nominated in the Specification and/or environmental management plan.

16.5 BLASTING

Adjust the last paragraph:

Where ~~authorisation~~ approval is granted, prepare a blasting plan that includes management of the blasting and means to be used to satisfy the requirements of AS 2187.2 Appendix A and the ~~authorising~~ approving parties.

16.6 SUPPORT OF EXCAVATIONS

Adjust the first paragraph as follows:

Support all excavations in accordance with:

a) the Specification and/or Design Drawings;

b) the applicable WHS Act;

c) the Model Code of Practice for Excavation; and

d) any risk control measures described in the Safety Assurance Plan and/or Job Safety Analysis.

Support trenches of depth 1.5 m or greater or in unstable ground strata.

Delete the first sentence in the second paragraph.

16.8 FOUNDATIONS AND FOUNDATION STABILISATION

Insert after the first paragraph:

During excavation, monitor the soil type and soil conditions of the trench wall and foundation.

Replace the reference to Standard Drawing WAT-1200 with SEQ-WAT-1200-1 and SEQ-WAT-1200-2***.***

16.9 SURPLUS EXCAVATED MATERIAL

Add the following at the end of the clause*:*

Surplus material and excess spoil must be stockpiled, tested, classified and disposed of following the relevant state or territory waste classification requirements.

Add the following new sub-clauses 16.10 TRENCH EXCAVATION, 16.11 REFILL OF EXCESSIVE EXCAVATION, and EXCAVATION AND PIPELAYING USING TRENCHLESS TECHNIQUES

16.10 TRENCH EXCAVATION

16.10.1 General

Ensure that the minimum cover requirements shown on Design Drawings are satisfied following any earthworks that may occur in the area of the sewer main.

From commencement of excavation, maintain trenches in a stable condition to prevent movement or collapse. Minimise the length of trench open at any one time.

Ensure the trench centreline aligns with the design centreline of the pipeline within the specified tolerances.

Excavate to at least the minimum width shown on the Design Drawing(s) but not greater than that required for the ground support system. Where the minimum width is exceeded by more than 500 mm, have the structural condition of the pipeline assessed by the Superintendent.

Routinely monitor soil types and soil condition. Notify the relevant person (e.g. Superintendent, Designer, Geotechnical Specialist) of any occurrence of significant difference from the predicted soil type or conditions. Do not proceed with pipeline installation at the locations of interest until the structural design has been re-evaluated and confirmed or modified.

With the exception of where a special base is required, excavate below the invert of the pipe to at least the depth shown on the Design Drawing(s) but not more than 50 mm below that depth.

If the excavation protrudes outside of the easement, backfill and compact the trench in accordance with the Water Agency's and Owner's requirements, otherwise arrange for the easement to be widened.

16.10.2 Construction of embankment

Where compaction of the embedment material in an embankment to the required density will not be possible owing to the absence of side containment, first construct the embankment to top of the pipe embedment zone and then cut a trench for installation of the pipeline.

16.11 REFILL OF EXCESSIVE EXCAVATION

Where the excavation depth and width exceed those specified in **22 TOLERANCES ON AS-CONSTRUCTED WORK**, arrange for the Superintendent to assess the structural requirements of the pipe and provide direction on refilling the excessive excavation with one of the following:

In foundation and embedment zones:

a) In wet sandy conditions, 20 mm single size coarse aggregate; and

b) Elsewhere:

i) 20 mm Class '2' crushed rock, or;

ii) 3% cement stabilised 20 mm Class '2' crushed rock, or;

iii) N20 Grade concrete, formed or screeded to an even and uniform finish.

In trench fill (backfill) zones:

(A) Under road pavements, 20 mm Class '2' crushed rock; and

(B) Elsewhere:

1) Embedment concrete sand; or

2) Selected excavated material containing no rock fragments larger than 20 mm or hard clay fragments larger than 40 mm.

Place and compact all refill (apart from concrete) to the relative compaction value specified for embedment material in trafficable or non-trafficable areas, as applicable, as given in Table 21.1.

16.12 EXCAVATION AND PIPELAYING USING TRENCHLESS TECHNIQUES

Excavation using trenchless techniques differs significantly from typical open trench excavations due to the difficulty of determining accurate geological properties and the potential variability of these properties along the excavation route.

Trenchless excavation may include tunnelling, horizontal boring, directional drilling and/or micro-tunnelling.

Trenchless excavation design is based on less reliable material property assumptions than typical trenching operations.

Before submitting a trenchless excavation proposal for approval to the Superintendent, engage an appropriately qualified design consultant to:

(a) review existing geological information;

(b) undertake a site investigation to confirm the existing information and as necessary obtain more specific local geological information; and

(c) prepare Design Drawings and a trenchless excavation specification which, inter alia, should specify the geological conditions assumed in the design, including relevant issues.

(d) Upon approval of a trenchless installation:

(i) implement an inspection plan to compare the actual geological conditions as the excavation progresses with the assumed conditions; and

(ii) implement procedures to assess the implications of any changes in conditions and reassess the adequacy of the trenchless excavation design and ground support before the changes become a risk to health and safety. This may include ceasing relevant work while the reassessment is being conducted.

17.3 PLACEMENT OF BEDDING

Add the following at the end of the clause:

If alteration of the bedding design as specified is required to suit the actual ground conditions on site, advise, record for verification and provide documented remedial assessment to the Superintendent.

The Superintendent should seek instruction from the Designer in most instances.

Keep all dewatering systems operating during backfilling so that no fill material is placed or compacted under water. At all times ensure that the pipes are not damaged or moved during placement and compaction of fill.

Where the pipe is supported on concrete or is concrete encased, do not place overlay material until the concrete has attained its initial set and a minimum of 24 hours after pouring.

Where specified, envelop the embedment material with geotextile filter fabric.
Replace the reference to Standard Drawing PSS-1000 with SEQ-PSS-1000-1.

17.4 SPECIAL PIPE SUPPORT FOR NON-SUPPORTIVE SOILS

Replace the reference to Standard Drawing PSS-1000 with SEQ-PSS-1001-1.

18.1 GENERAL

Insert below sentence after the second paragraph:

All pipes to be stored and handled in accordance with the manufacturer's recommendations.

Insert below sentence at the end of the section:

Undertake welding of PE pipes and fittings in accordance with clause **18.6 WELDING OF PE PIPELINES** .

Replace 18.2 CLEANING INSPECTION AND JOINT PREPARATION, through to 18.6 JOINTING with the following clauses 18.2 CLEANING INSPECTION AND JOINT PREPARATION to 18.9 CONNECTIONS TO PIPES OF OTHER MATERIALS

18.2 CLEANING, INSPECTION AND JOINT PREPARATION

Inspect all items just prior to use in accordance with Clause **14.2 DELIVERY INSPECTION OF PRODUCTS AND MATERIALS.** Remove damaged items from the Works site and replace.

Inspect all pipeline system items before installation to confirm they are of the type, size and classification specified for the installation.

Inspect pipe and fittings to ensure they are free of obstructions and foreign materials which could interfere with the performance of the pipeline system. If any obstructions of foreign material are found, they should be removed.

Chamfer, if required, and provide witness marks on the unmarked length of any cut pipes. Do not score pipes when providing the witness mark.

Treat cut pipe ends in accordance with pipe manufacturer's recommendation.

For fusion jointing of polyethylene pipes and fittings prepare the jointing surfaces and the geometry of the assembly in accordance with PIPA POP001 and POP003.

Do not use electrofusion fittings that have been removed from their packaging or have damaged packaging.

PIPA Industry Guideline POP001 Electrofusion Jointing of PE Pipe and Fittings for Pressure Applications may be used for guidance for non-pressure applications.

PIPA Industry Guideline POP003 Butt Fusion Jointing of PE Pipes and Fittings – Recommended Parameters may be used for guidance for non-pressure applications.

18.2.1 Coiled plastics pipes

De-coil and treat plastics pipes in accordance with coil handling and processing procedures previously documented and validated (Refer to 14.5.5 Coiled plastics pipe).

Additional information on storage, transport and handling of coiled PE pipes may be found in PIPA Guideline POP005. In particular, attention is drawn to the dangers associated with stored energy in coiled pipes or those rolled on drums.

18.3 OPEN TRENCH INSTALLATION

After preparing pipe bedding, lay and joint pipes in locations and sizes as specified.

Pipes may be jointed at ground level and then lowered into position.

PE pipes shall be laid in the trench to line and level with full embedment and partial trench backfill without restricting the ends until the pipe has had time to stabilise to ground temperature.

Where pipes are supplied coiled on a drum, use a decoiler to straighten and restore the roundness of the pipe.

Where curvature of the pipe is to be achieved by cold bending, cold bend the pipe with a uniform radius along the length of the pipe in accordance with manufacturer's instructions. Do not exceed bending radii specified in POP202. Under no circumstances is the curvature of a pipe to be more than 25 times the outside diameter of the pipe.

90-degree bends shall be accomplished by installing two 45-degree bends with a separation of 300 mm, or by installing a long radius bend. Minimum ground cover shall be in accordance with Standard Drawing PSS-1000.

Where manual cold bending of the pipe has been employed, the combined effect of pipe bending and thermal contraction shall be considered to ensure that strain in the pipe wall remains acceptable.

Remove temporary pegs or stakes for restraining or holding curved pipes after completion of pipelaying and placement of embedment material.

Maintain minimum vertical separation of crossing pipelines as specified. Fill the separation with embedment material and compact.

Prevent floatation of pipes by:

(a) Using trench stops in accordance with Standard Drawing SEQ-WAT–1209-1; and/or

(b) Placing and compacting sufficient height of fill material; and/or

(c) Filling the pipeline with water, where authorised; and/or

(d) Other appropriate method authorised by the Superintendent.

Where trench dewatering is necessary, fully place and compact embedment and fill material in accordance with Sections 19 and 20 while dewatering systems are operating.

Construct trench stops with trench drainage as specified.

Reference Standard Drawings: SEQ-WAT–1209-1 and SEQ-WAT–1210-1.

For trenchless installation of pipes, install in accordance with the Clause 18.4 TRENCHLESS INSTALLATION and the Specification and relevant Design Drawings.

18.4 TRENCHLESS INSTALLATION

Use trenchless installation only where specified in the design.

Where proposed trenchless installation will traverse under or near structures, including roadways, conduct a pre-construction survey of the structure to ascertain and document the integrity of the structure prior to construction.

During installation of the PE pipe from the surface and/or decoiler into existing cavities, take suitable mechanical handling precautions to ensure that the PE pipe is not damaged. Do not exceed a bending radius of 25 times the outside diameter of the pipe.

Limit the maximum end load to that causing a maximum allowable strain for the pipe material or as specified on the design drawings.

Allow the installed PE pipe to relax after insertion for at least a period equal to the time of insertion loading.

Where, after installing a pipe in a bore, pipe surface damage e.g. scoring is found to exceed 10% of pipe wall thickness at any point in the exterior of the pipe exterior, remove the pipe and replace it with a pipe that provides a wall thickness equivalent to that of the original pipe plus the greatest depth of pipe surface damage found after the original pipe installation. *This requirement may be waived if it can be demonstrated that design of the original pipe took into account potential for surface damage during installation.*

18.5 JOINTING TECHNIQUES

Undertake all pipe fusion processes above ground except in circumstances where it can demonstrated to the Superintendent that it is not technically practicable.

For PE pipes up to and including DN 90 and for pipes of different SDRs, use electrofusion jointing.

Jointing of PE pipe and fittings shall be in accordance with Table 18.1. Do not butt weld pipes of different SDRs.

TABLE 18.1

JOINTING TECHNIQUES FOR PE PIPE

Pipe Diameter	Allowable Jointing technique	Preferred Jointing Technique
≤ DN 90	Mechanical fittings, EFJ	Mechanical fittings
>DN 160 ≤ DN 450	EFJ, BFJ	BFJ
> DN 450	EFJ, BFJ	BFJ

The use of mechanical coupling compression fittings shall be kept to a minimum, and only to be used for on-property works following consultation with the Designer and approval by Water Agency Permissible locations for these fittings are where the pipe connects to the collection tank and either side of the property boundary assembly. The pressure rating of the fittings shall be PN16 as a minimum, or to match the class of the associated pipework.

Complete cleaning, inspection and joint preparation in accordance with 18.2 CLEANING, INSPECTION AND JOINT PREPARATION.

When fusion jointing of polyethylene pipes and fittings refer Clauses 18.6 WELDING OF PE PIPELINES and PIPA POP001 and POP003.

NOTE PIPA Industry Guideline POP001 Electrofusion Jointing of PE Pipe and Fittings for Pressure Applications may be used for guidance for non-pressure applications.

NOTE PIPA Industry Guideline POP003 Butt Fusion Jointing of PE Pipes and Fittings – Recommended Parameters may be used for guidance for non-pressure applications.

18.6 WELDING OF PE PIPELINES

18.6.1 General

Use electrofusion and/or butt fusion welding for joining pipe-to-pipe or fitting-to-pipe.

Undertake all welding in accordance with the Specification relevant Design Drawings and approved jointing procedures as specified in 18.6.2 PE Butt Fusion Welding and 18.5.3.PE Electrofusion Welding.

Butt fusion and electrofusion shall be performed by competent persons having current certification and experience as defined in 18.6.6.

18.6.2 PE Butt Fusion Welding

Butt-fusion jointing procedures shall be in accordance with ISO 21307.

Other fusion procedures may be used subject to approval by the Water Agency.

PIPA Industry Guideline POP003, should be used for guidance on the butt fusion jointing of PE pipe and fittings.

All equipment for butt fusion jointing shall comply with the requirements of ISO 12176-1.

Butt fusion joints shall be validated by test before welding commences on site – see clause **18.6.4.1 Butt Fusion – Pre-Construction test welds**

18.6.3 PE Electrofusion Welding

Electrofusion procedures shall be carried out in accordance with the manufacturer's instructions for each specific size and type of fitting.

Electrofusion control boxes shall comply with ISO 12176-2.

PIPA Industry Guideline POP001, should be used for guidance on the electrofusion jointing of PE pipe and fittings for pressure applications.

Electrofusion joints shall be validated by test before welding commences on site – see clause **18.6.4.2 Electrofusion – Pre-Construction test welds**

18.6.4 Weld Testing Butt Fusion and Electrofusion Joints

Joining pipes and fittings by electrofusion or butt fusion shall be to an approved jointing procedure that has been qualified by destructive testing in accordance with ISO 13953 and ISO 13954.

Fusion joining procedures shall be qualified prior to the commencement of welding on site

18.6.4.1 Butt fusion – Pre-Construction test welds

Before production jointing commences qualification of the butt fusion procedure shall be carried out unless a suitable pre-qualified procedure has been approved by the Water Agency. Qualification establishes the optimum weld procedure for the project within the scope of the ranges for each individual parameter nominated in ISO 21307.

Qualification welds shall optimise the weld parameters and be tested in accordance with ISO 13953 Polyethylene (PE) pipes and fittings – Determination of the tensile strength and failure mode of test pieces from a butt-fused joint.

Qualified Procedures may be grouped by diameter to reduce the amount of qualification testing. The recommended groupings are shown in **Table 18.2** below:

TABLE 18.2

BUTT FUSION TESTING QUALIFICATION REQUIREMENTS

Procedure Qualification Test Pipe Diameter and each fitting brand	Qualifies for sizes
Any ≤DN225	Any ≥ DN90 to DN225
Any >DN225 – DN450	DN225 -DN450
>DN450	Each pipe diameter shall be tested

A pilot weld shall be undertaken for each welder, welding machine, pipe diameter and wall thickness using the qualified procedure.

A record of the parameter values for each weld shall be made.

Each pilot weld shall be performed on the actual pipe used in the project and under site conditions.

Pilot welds shall be tested in accordance with ISO 13953.

Options to assist in the interpretation and assessment of butt fusion tensile tests can be found in PIPA document POP014.

Only when these pre-construction joints pass the acceptance criteria shall the project proceed.

Test samples shall be identified by

a) *pipe size,*
b) *SDR,*
c) *PE material composition grade,*
d) *date,*
e) *actual weld parameters used*
f) *welder number, machine and welding conditions at the time of welding.*

Butt fusion joint samples shall be submitted for destructive testing to an approved NATA registered testing laboratory.

A field welding QA plan shall be submitted, and approved, before welding commences. REFER TO CLAUSE 18.6.5 QUALITY PLAN

18.6.4.2 Electrofusion – Pre-Construction test welds

Before production jointing commences qualification of the electrofusion procedure shall be carried out.

Qualified electrofusion joints may be grouped by diameter to reduce the amount of qualification testing. The recommended groupings are shown in table **Table 18.3**

TABLE 18.3

ELECTROFUSION SOCKET AND SADDLE JOINT TESTING QUALIFICATION REQUIREMENTS

Procedure Qualification Test Pipe Diameter and each fitting brand	Qualifies for sizes
Any ≤DN225	≤DN225
>DN225	Each pipe diameter shall be tested

Test joints shall be cut such that there is a minimum of 300 mm of pipe protruding either side of the joint.

Test samples shall be identified by

a) *pipe size,*
b) *SDR,*
c) *PE material composition grade,*
d) *date,*
e) *type and brand of fitting*
f) *welder number, machine and welding conditions at the time of welding.*

Electrofusion joint samples shall be submitted to an approved NATA registered testing laboratory.

Electrofusion joints shall be tested using the peel decohesion test in accordance with the requirements of ISO 13954.

When tested, electrofusion joints shall meet the requirements of AS/NZS 4129 Clause 3.5 Mechanical characteristics.

Only when these pre-construction joints pass the acceptance criteria shall the project proceed.

A field welding QA plan shall be submitted, and approved, before welding commences. REFER Clause **18.6.5 QUALITY PLAN**

18.6.5 QUALITY PLAN

18.6.5.1 General

A field welding quality plan shall be submitted, and approved, before welding commences.

A quality plan shall be prepared to demonstrate:

a) *Safe Work Method statements and Job Safety Analysis*

b) *Thermoplastic Welder Personnel Training and Qualifications*

c) *Equipment details, brand, model, maintenance, servicing, and calibration of equipment*

d) *Welding and joining procedures / including a record of all weld parameters.*

e) *Test Sampling Plan for the number of test welds to be undertaken during the construction phase.*

f) *Pre-construction test welds using inputs from items (b), (c) and (d)*

g) *inspection and test records.*

It is also recommended that quality records for each weld, numbered and located on a plan of works, be retained for at least 6 years from the date of installation.

18.6.5.2 Butt fusion – Test Sampling Plan during construction

Before construction commences qualification and pilot welds shall meet the test criteria - refer to Clause **18.6.4.1.**

Once construction commences two types of testing shall be applied:

a) *Visual inspection of each joint*

b) *Destructive testing of a selected joint. The Water Agency shall nominate the specific joint that will be destructively tested.*

18.6.5.2.1 Visual inspection

All butt fusion joints shall be visually inspected around the full circumference.

All butt fusion joints shall be assessed in accordance with Table 1 and Table 2 of PIPA document POP 014. Joints that fail the acceptance criteria shall be reported, the parameters and welding process shall be investigated and corrective action taken. The Water Agency may require the joint be cut out.

All butt fusion joint external weld beads shall be removed using a suitable bead removal tool and then tested in accordance with POP014. If the bead separates, the parameters and welding process shall be investigated, reported and corrective action taken. The Water Agency may require the joint be cut out.

18.6.5.2.2 Destructive testing

Samples for destructive testing of butt fusion joints shall be provided for each individual pipe size and standard dimension ratio (SDR) as follows:

a) joint in the first 10 joints
b) joint in every 20 joints (or part thereof) for the remainder of the pipeline after the testing of the first joint as prescribed above meets the testing requirements.

Note: Following a series of successful joint tests the test frequency maybe further reduced with the approval of the Water Agency based on consistent successful welder performance. For example the test frequency could be reduced to 1 joint in every 50 joints (or part thereof) for the remainder of the pipeline.

Where testing reveals nonconformance to the test requirements the joint shall be reported, investigated and any corrective action recommended. In addition the previous weld to the failed test weld shall be cut out and tested. If the second weld also fails to meet the test criteria the project shall be stopped. Testing shall continue until the Contractor can demonstrate the welds meet the testing requirements.

18.6.5.3 Electrofusion – Test Sampling Plan during construction

Before construction commences qualification and pilot welds shall meet the test criteria, . refer to 18.6.4.2 Electrofusion– Pre-Construction test welds.

Once construction commences two types of testing shall be applied:

a) Visual inspection of each joint

b) Destructive testing of a selected joint. The Water Agency shall nominate the specific joint that will be destructively tested.

18.6.5.3.1 Visual inspection

All electrofusion joints shall be visually inspected in accordance with the acceptance criteria of table 4 of POP 014. Joints that fail the acceptance criteria shall be reported, investigated and any corrective action recommended and if required by the Water Agency shall be cut out and replaced with new fittings.

Electrofusion couplings and saddles that indicate error readings, short circuiting, exposed wires, failure of coupling melt indicators and or melt outside the weld zone shall be cut out and replaced with new fittings.

18.6.5.3.2 Destructive testing

Samples for destructive testing of electrofusion joints shall be provided for each individual pipe size as follows:

(a) 1 joint in the first 10 joints

(b) 1 joint in every 20 electrofusion joints (or part thereof) for the remainder of the pipeline after the testing of the first joint as prescribed above meets the testing requirements.

Note: Following a series of successful joint tests the test frequency maybe further reduced with the approval of the Water Agency based on consistent successful welder performance. For example the test frequency could be reduced to 1 joint in every 50 joints (or part thereof) for the remainder of the pipeline.

Where testing reveals nonconformance to the test requirements the joint shall be reported, investigated and any corrective action recommended. In addition the previous weld to the failed test weld shall be cut out and tested. If the second weld also fails to meet the test criteria the project shall be stopped. Testing shall continue until the Contractor can demonstrate the welds meet the testing requirements.

18.6.6 Welder qualifications

All welders shall have successfully undertaken the following Units of Competence of the Plastics, Rubber and/or Cable making Training Package PMB07 appropriate to the welding processes used:

(a) PMBWELD301E - Butt weld polyethylene plastic pipelines

(b) PMBWELD302E - Join polyethylene plastic pipelines using electrofusion welding

Training shall be provided by Registered Training Organisations (RTO's) that are accredited by State/Territory Training Authorities under the Australian National Training Authority (ANTA) guidelines and conforming to PMB 07 Competency Standards prepared by Manufacturing Learning Australia, Qualification Framework for the plastics, rubber and cable making industry.

RTOs listed on the PIPA website (https://pipa.com.au/welder-training/) are preferred as they also commit to deliver a detailed course curriculum.

The RTO's providing training in all forms of welding plastics pipeline systems shall have staff qualified in presenting courses that meet competency standards covered by PMBWELD301E and PMBWELD302E.

“Successfully undertaken” shall mean “Statement of Attainment” for all those appropriate Units of Competence.

Only personnel who have successfully completed the above training programs shall be permitted to butt fuse or electrofusion PE systems .

Certification shall be valid for 2 years. At the end of this period, renewal of the certification shall be required.

Certified welders shall demonstrate continuous welding activity and any break of more than six months shall require renewal of certification.

Certification details shall be carried by field personnel on-site, and be made available as required.

In addition to having current certification welders shall be initially restricted to welding pipes and fittings in sizes <DN 225 until they can demonstrate either a successful track record of welding within this size range or that they have undertaken specific training on larger size pipe.

Welders demonstrating a successful track record of welding in sizes up to DN 225 shall be permitted to weld pipelines up to DN 450. Similarly, welders shall demonstrate a successful track record of welding up to DN 450 before being permitted to weld pipes and fittings >DN 450.

18.7 ~~JOINTING~~ MECHANCIAL FITTINGS

The use of compression fittings shall be kept to a minimum, and only used following consultation with the Designer and approval by Water Agency.

Possible locations where compression fittings may be approved include:

(a) where the pipe connects to the collection tank;

(b) either side of the property boundary assembly, as shown in Standard Drawing PSS-1102.

(c) tee insertion for a pressure sewer lateral on a DN 50 PE reticulation pressure sewer main (only) as shown on PSS-1103

(d) tapping assembly for a pressure sewer lateral as shown on PSS-1103.

The pressure rating of the fittings shall be PN16 as a minimum, or to match the class of the associated pipework.

18.8 LIVE CONNECTIONS TO PRESSURE SEWER SYSTEMS

Connections to live sewers should not take place unless approved by the Water Agency.

All tappings shall be clean with no damage occurring to the surrounding structures.

To connect into existing main, wet tapping via branch saddle with an offtake size min DN40 shall be used. The branch saddle shall be an electrofusion polyethene fitting with a Tee connection to the side of the main (90 degree) bends or connections to the top of main are not acceptable). An isolating valve shall also be located on the branch line at no more than 400mm from the Tee connection.

All electrofusion weld shall be pressure tested prior to tapping into the pipe. For property discharge lines, installation must be complete prior to pressure testing. This includes the installation of the collection tank, the property discharge line, the boundary assembly and the connection to the reticulation line (without the tapping). Only after the pressure testing has passed, can the final tapping into the reticulation pipe proceed.

Tapping of the main will be undertaken by drilling through the open bore of the isolation valve using an appropriate tapping machine/tool ensuring that there is no discharge from the receiving pipe. Ensure a clean hole is made through the receiving pipe to form the connection and there is no damage to the receiving pipe.

Where branch saddle for DN50 is not available, the main shall be cut in with an electrofusion tee with an offtake size min DN40. Alternatively, if main cannot be isolated, squeeze-off method as per PIPA POPO is acceptable. Where manual cold bending of the pipe has been employed, the combined effect of pipe bending and thermal contraction shall be considered to ensure that strain in the pipe wall remains acceptable.

18.9 CONNECTIONS TO PIPES OF OTHER MATERIALS

Make connections to PVC/ABS/DI/steel pipelines using PE flange adaptors and backing rings with AS/NZS 4087 Figure B2 mating dimensions

Make connections to non pressure VC/GRP/RC pipelines using a spigot end adaptor welded to the PE pipe spigot and utilising the socket and sealing ring of the VC/GRP/RC pipe.

18.10 THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Re-number 18.7 THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS to 18.10 THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Replace the reference to Standard Drawings WAT-1205, WAT-1206, WAT-1207 and WAT-1208 with SEQ-WAT-1205-1, SEQ-WAT-1206-1, SEQ-WAT-1207-1 and SEQ-WAT-1208-1 ***respectively***.

18.11 PRESSURE SEWER LATERALS, PROPERTY BOUNDARY ASSEMBLIES

Renumber 18.8 PRESSURE SEWER LATERALS, PROPERTY BOUNDARY ASSEMBLIES to 18.11 PRESSURE SEWER LATERALS, PROPERTY BOUNDARY ASSEMBLIES

Replace 1st paragraph with:

At the time of construction of the reticulation system, install pressure sewer laterals including property isolation valves as specified, refer to Clauses 1.5.3, 6.1.3 and 6.3.

Only SS316 valves may be used on services (brass or plastic valves are not acceptable).

Replace the reference to Standard Drawings WAT-1102, WAT-1106, WAT-1107, WAT-1108 and WAT-1109 with SEQ-WAT-1102-1 and SEQ-WAT-1200-2.

18.12 ON-PROPERTY ITEMS

Renumber 18.9 ON-PROPERTY ITEMS to 18.12 ON-PROPERTY ITEMS Also renumber the respective sub clauses

18.12.1 Collection/Pump units

Replace the 1st paragraph with:

Install the collection/pump units in accordance with the Design Drawings, the manufacturer's recommended installation instructions and Council Plumbing Section's requirements.

The tank shall be filled, up to the inlet pipe invert level, with water prior to pouring the concrete anchor to prevent the tank from "floating" before the concrete sets.

18.12.2 Customer sanitary drains

Replace the reference to Standard Drawing PSS-1101 with SEQ-PSS-1101-1.

18.12.3 Property discharge lines

Replace the reference to Standard Drawing PSS-1000 with SEQ-PSS-1000-1.

18.13 PIPELINE TRACER WIRES AND DETECTABLE MARKING TAPES

Re-number 18.10 PIPELINE TRACER WIRES AND DETECTABLE MARKING TAPES to 18.13 PIPELINE TRACER WIRES AND DETECTABLE MARKING TAPES

Replace the 3rd paragraph with the following:

When installing pipes in cavities, attach a tracer wire secured to the obvert of the pipe.

Replace the reference to Standard Drawing PSS-1000 with SEQ-PSS-1000-1.

Add the following paragraphs at the end of the clause:

Prior to placement of trench fill detectable marking tape is to be placed over the embedment material.

Pipelines installed by open trench excavation shall use Water Agency approved detectable marking tape with a 316 stainless steel tracer wire in accordance with WSA PS-318.Bare wires from the tape are to be connected by a 316 SS 'U Clamp' to the next available termination feature. Splicing of two ends of tracer wire by hand twisting alone, or "twitching," shall not be acceptable under any circumstances. Termination points for

the tracer wire shall be located at in- line fittings and features such as isolation valves, air valves, flushing points, pressure sewer pumping unit, the property boundary assembly, etc and shall be readily accessible at these points such as to allow energising of the trace wire for location purposes. Different tracer tapes are required for pipelines with different uses.

18.14 MECHANICAL PROTECTION OF PIPELINES

Re-number 18.11 MECHANICAL PROTECTION OF PIPELINES to 18.14 MECHANICAL PROTECTION OF PIPELINES

Replace the first sentence of the clause with the following:

Ensure any pipeline constructed above ground or under or near structures and major roadways or at non-standard shallow depth is mechanically protected to minimize future maintenance.

Replace the reference to the Standard Drawings PSS-1001, PSS-1002 and PSS-1003 with SEQ-PSS-1001-1, SEQ-PSS-1002-1 and SEQ-PSS-1003-1 respectively.

Add the following requirement as a last sentence of this clause:

Any mechanical protection shall be approved by SEQ-SPs.

18.15 SQUEEZE-OFF

Re-number 18.12 SQUEEZE-OFF to 18.15 SQUEEZE-OFF

18.16 VALVES, VALVE CHAMBERS, SCOURS AND SURFACE FITTINGS

Re-number 18.13 VALVES, VALVE CHAMBERS, SCOURS AND SURFACE FITTINGS to 18.16 VALVES, VALVE CHAMBERS, SCOURS AND SURFACE FITTINGS

Replace the reference to Standard Drawing WAT-1307 with SEQ-WAT-1307-3.

18.17 CROSSINGS

Re-number 18.14 CROSSINGS to 18.17 CROSSINGS

Replace the reference to Standard Drawings PSS-1003 and WAT-1312 with SEQ-PSS-1003-1 and SEQ-WAT-1312-1 ***respectively.***

18.18 LOCATION MARKERS

Re-number 18.15 LOCATION MARKERS to 18.18 LOCATION MARKERS

Insert the following paragraph at the end of this clause:

Location markers are also required where pressure sewer pipes are installed at varying offsets or in locations that may make it difficult to locate the pipes in the future. Location markers are required at changes of direction, valves, fittings and at max. 200m centres.

19.2 EMBEDMENT MATERIALS

Replace Clause 19.2 (a) with:

(a) Listed in the SEQ Accepted Product and Material List”

In Clause 19.2 (b) replace the word Purchase with Product

Delete Table 19.1.

Replace the reference to Standard Drawings PSS-1000 and PSS-1001 with SEQ-PSS-1000-1 and SEQ-PSS-1001-1 respectively.

19.4 SPECIAL BEDDING AND EMBEDMENTS / GEOTEXTILE SURROUND AND PILLOW

Replace the reference to Standard Drawing PSS-1001 with the SEQ-PSS-1001-1

19.7 CONCRETE EMBEDMENT AND ENCASEMENT

Replace the reference to Standard Drawings PSS-1001, PSS-1002, PSS-1003 and PSS-1004 with SEQ-PSS-1001-1, SEQ-PSS-1002-1, SEQ-PSS-1003-1 and SEQ-PSS-1004-1 ***respectively.***

20 FILL

Insert:

Where the trench exists within a Roadway, the requirements of the relevant road authority take precedence over this Section.

20.1.1 Placement

Replace the reference to Standard Drawings PSS-1000 and PSS-1001 with SEQ-PSS-1000-1 and SEQ-PSS-1001-1 ***respectively.***

21.1 GENERAL

Add the following requirements at the end of this clause:

All the installations of on-property components for new or existing houses shall be inspected and approved (including final inspection and acceptance) by the relevant Council Plumbing Section.

SEQ-SPs are responsible for the reticulation system outside the serviced property, refer Part 1 Preface and Clause 1.5.3.

21.3.3.1 Applicable pipe sizes

Replace the reference to Standard Drawing WAT-1200 with SEQ-WAT-1200-1.

21.3.4 Trench fill compaction testing

Insert the following into this clause:

Where the Trench exists within a Roadway, the requirements of the relevant road authority take precedence over this section.

21.3.4.1 Trafficable areas test zone

Replace the reference to Standard Drawing PSS-1000 with SEQ-PSS-1000-1.

21.5.2 Test procedure selection

Amend the first sentence as follows:

Unless otherwise specified, use the basic pressure test ~~(visual)~~ for both standard trenching and trenchless construction for

(a) PE pipe installations ≤ DN 250 and/or

(b) short/lengths and/or

(c) less critical applications

~~using both standard trenching and trenchless construction.~~

21.5.3 Basic pressure test ~~(Visual)~~

Insert two new dot points after (d) and re-number remaining dot points as shown

(e) If no evidence of leak of test water after at least 15 minutes, the section may be deemed to have passed the test.

*(f) Where the joins are not accessible for inspection and apparent loss of water after a minimum test period of 2 hours is less than that calculated from the equation in Clause **20.5.2***

(g) ~~(e)~~Where no leak is detected, open high point appurtenances and depressurise to slowly drain the line and make good all connection points.

(h) ~~(f)~~Record the location of the test section, the water temperature, test pressure and duration, the date and the test results.

21.7 COLLECTION/PUMP UNIT

Add the following at the end of the clause:

and evidence provided to the Water Agency for acceptance.

Add new clause as follows:

21.9 POLYETHYLENE PIPELINES INSTALLED USING HDD TECHNIQUES

An additional 3 m length of pipeline shall be butt welded to the leading end of the pipe string prior to placement. After the pipeline has been pulled through sufficiently to expose the additional 3 m length, the Superintendent and the Contractor shall jointly examine it.

If the pipe length is significantly damaged, as defined below, complete replacement of the entire pipeline will be required. Significant damage is defined as:

a) Scratches deeper than 10% of the pipe wall thickness evident; and/or

b) Any evidence of plastic failure of the pipe due to tensile forces (e.g. necking or reduction in outside circumference compared with the supplied pipe).

24.1 ASSET DOCUMENTATION

Replace bullet point (a) with the following:

(a) Address and allotment details, including roadways and easements

Replace the last paragraph with:

Submit documents to the Council Plumbing Section and relevant SEQ-SP upon completion of construction.

24.2 WORK AS CONSTRUCTED DETAILS

Amend the first sentence of this clause as below:

Prepare and submit work as constructed drawings and documentation in accordance with the SEQ Asset information Specification.

Replace (a), (e) (h) and (i) with the followings:

(a) The Asset Register Table for all components.

(e) Regular offset for the pressure reticulation sewer from property boundaries (either prolongations of side boundaries and buildings or ties from front boundaries).

(h) The total length of pressure sewer main for each pipe diameter.

(i) The number and the total length of each size of pressure sewer lateral.

Add items (j), (k) and (l) after (i) as below:

(j) Construction start and completion dates.

(k) Any variations to the fitting list.

(l) Location and dimensions of all on-property assets and components relative to property boundaries and building outlines.

Add the following requirement at the end of this clause:

All “As Constructed” drawings shall have a text block as shown in the SEQ Total Asset Information Specification which shall be signed by an RPEQ to certify that they represent a true record of works.

Appendices

Appendix LPSS -A – Example Drawings

To be developed