QUEENSLAND UrbanUtilities

TECHNICAL GUIDELINE:

DESIGN AND DOCUMENTATION OF WATER RETICULATION AND WASTEWATER (SEWERAGE) INFRASTRUCTURE

September 2019

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APPENDICES

Comments or suggestions regarding these guidelines should be sent to: developmentenquiries@urbanutilities.com.au.

Comments or suggestions regarding the *South East Queensland Water Supply and Sewerage Design Construction Code* (or the SEQ Code) should be detailed on the 'Document Improvement Request Form' at www.seqcode.com.au and emailed to: qldwater_seq_code@qldwater.com.au. Visit www.seqcode.com.au for further information.

1 Introduction

These guidelines are intended to assist engineering consultants prepare design documentation for proposed water reticulation and sewerage donated assets related to development activity within the Queensland Urban Utilities service territory. A list of abbreviations and acronyms used in this document is included in Appendix B.

2 Scope and Limitations

These guidelines cover the design and documentation of civil components of water reticulation and sewerage assets (excluding pressure sewerage systems and vacuum sewerage systems). Trunk assets and complex assets such as pumping stations, reservoirs, treatment plants, trunk pipelines etc. are also excluded.

The guidelines do not fully describe all design and construction requirements of Queensland Urban Utilities or the *South East Queensland Water Supply and Sewerage Design and Construction Code* (the SEQ Code), but provide basic guidance to improve consistency in the design and documentation of assets constructed by developers. All designs shall be prepared and certified by a Registered Professional Civil Engineer of Queensland (RPEQ) considering all relevant construction, operational, maintenance, repair and demolition aspects.

Queensland Urban Utilities will update this document when changes are made to Queensland Urban Utilities' technical standards (including the SEQ Code). If the SEQ Code and these guidelines conflict, the requirements of the SEQ Code and Netserv Plan take precedence.

Developers and their consultants/agents are responsible at all times for ensuring that all works are executed in accordance with sound engineering principles and practices.

2.1 External Agency Approvals

It is the applicant's responsibility to obtain the endorsement of the design documentation from any other necessary agency e.g. Queensland Rail (QR), local council, private property owners, other Queensland/Federal Government departments or agencies, other service authorities etc. Any endorsement of the design documentation by Queensland Urban Utilities does not infer that any other agency has endorsed/approved the design. It is the applicant's responsibility to prepare the design in accordance with the requirements of all relevant stakeholders. Queensland Urban Utilities require a copy of the design endorsement by other agencies to be submitted to Queensland Urban Utilities.

3 Queensland Urban Utilities Review Process – Major Works

Queensland Urban Utilities will review the design documentation in accordance with the conditions of the Water Approval and Queensland Urban Utilities technical requirements, including but not limited to the SEQ Code. Queensland Urban Utilities will approve, approve with conditions, or refuse the documentation.

If further information is required to undertake the assessment, or if amendments are necessary to comply with the conditions of the Water Approval or Queensland Urban Utilities' technical requirements, a Request for Further Information (RFI) will be issued.

If the design documentation contains fundamental errors the Design Package be refused and returned without further assessment.

3.1 Lodgement

The Design Package must be submitted with the completed form *Design Package Submission Form – Major Works*. If the Design Package is incomplete, Queensland Urban Utilities will not undertake the review. All non-conformances to Queensland Urban Utilities' technical requirements must be identified for assessment.

3.2 Request for Further Information

If further information is required to undertake the assessment, or if amendments to the design package are necessary, a Request for Further Information will be issued. Queensland Urban Utilities will only re-commence review upon receipt of all requested information/amendments and payment of any necessary re-checking fee. It is the applicant's responsibility to submit all necessary documentation in accordance with Queensland Urban Utilities' requirements to enable efficient assessment of the design documentation.

3.3 Endorsement of Design Package

Once the design documentation has been prepared to the satisfaction of Queensland Urban Utilities, Queensland Urban Utilities will endorse the design in accordance with the conditions of the Water Approval.

Any endorsement of design documentation by Queensland Urban Utilities does not imply that the design has been prepared taking into consideration all relevant design and construction requirements or the requirements of any other agency.

Queensland Urban Utilities is not responsible for undertaking quality assurance checking on behalf of the consultant, or for checking that all aspects of the design have been undertaken in accordance with all relevant factors that may affect construction. The responsibility for efficient, accurate, safe, compliant and constructible design remains with the certifying engineer.

3.4 Amendments to Design Package post approval.

If an amendment is required to the design documentation post-approval (e.g. due to a change in the design during construction), a request to amend the approved design documentation must be submitted to Queensland Urban Utilities. If an amendment to the design also affects the conditions of the Water Approval, an amendment to the Water Approval may also be required (applicable to both Major Works and Minor Works).

Standard assessment timeframes apply to all requests for amendment of a Design Package or Water Approval (Queensland Urban Utilities process approval periods are available on our website at www.urbanutilities.com.au/development). Consultants are encouraged to prepare design

documentation taking into consideration all relevant site constraints to minimise delays during construction associated with amendments.

4 General Criteria Applicable to All Applications

No.	CRITERIA	REFERENCE
1.	Network analysis provided to demonstrate network performance compliant with SEQ Code Design Criteria and conditions of Water Approval.	SEQ Code Design Criteria
2.	All drawings must show the infrastructure requirements to satisfy the conditions of the Water Approval. If amendments are made to the design that affect the content or conditions of the Water Approval (e.g. changes to the layout of the infrastructure, change to point of connection to the Queensland Urban Utilities network, change to the number of lots/m^2 Gross Floor Area (GFA)/property connections etc.) and as a result the infrastructure requirements differ from the conditions of the Water Approval, a request to amend the Water Approval must first be lodged with and approved by Queensland Urban Utilities before the design can be reviewed.	Water Approval Conditions
3.	All drawings must be certified by a RPEQ signature, with name, date signed and RPEQ number stated. The RPEQ is to update the date signed with each new revision to validate RPEQ endorsement of each revision.	SEQ Code
4.	Existing and proposed Queensland Urban Utilities infrastructure shall be suitably represented on the drawings. e.g details such as pipe diameter, pipe material, pipe pressure class, as well as fitting type, fitting size, fitting end-connections shall be clearly indicated. Clearly delineate limit of Queensland Urban Utilities pipework. Generally, private plumbing shall not be shown on the drawings. An exception is for private sewage rising mains in road reserves which must be shown on the design drawings and included in the Asset Design As Constructed (ADAC) submission for Queensland Urban Utilities records.	SEQ Code Asset Information Specification. SEQ Code Standard Drawings.
5.	Is any proposed Queensland Urban Utilities infrastructure outside the development site boundary extents? If 'Yes', investigate applicable land owner consent and design approval requirements, easement requirements, vegetation management requirements etc. Provide owner's consent for all affected landowners to Queensland Urban Utilities.	Water Approval Conditions
6.	Approval from the relevant local council authority is required for any Queensland Urban Utilities infrastructure outside the allocated Queensland Urban Utilities corridor/standard alignment in the road verge. Submit evidence of no-objection from relevant authority to Queensland Urban Utilities.	Council
7.	Approval from the Queensland Government is required for any Queensland Urban Utilities infrastructure located within Queensland Government-controlled road corridors. Submit evidence of no-objection from relevant authority to Queensland Urban Utilities.	Queensland Government

No.	CRITERIA	REFERENCE
8.	Approval from QR is required for any Queensland Urban Utilities infrastructure located within a QR corridor. Any work within a QR corridor requires a tri-party Wayleave Agreement with QR/developer/Queensland Urban Utilities. Developer to facilitate and obtain.	QR/Queensland Urban Utilities tri-party agreement
9.	The developer/agent is required to prepare the design taking into consideration requirements of any other agency e.g. vegetation management and protection/Natural Asset Local Law (NALL) permits, waterway barrier permits, cultural heritage protection, native title, etc. Any endorsement of the design documentation by Queensland Urban Utilities does *not* infer that any other external agency has endorsed/approved the particulars of the design.	Condition of Water Approval (council and/or Queensland Government agency)
10.	Implement and document Safety in Design processes. Document outcomes and risk register and provide to Queensland Urban Utilities. Eliminate hazards so far as is reasonably practicable (SFAIRP). QUU will provide input to the Safety in Design Process where necessary.	Work Health and Safety Legislation. Queensland Urban Utilities PRO662
11.	Any variations to the requirements of the SEQ Code, and the reason for the variation, must be identified in the Design Package for review by Queensland Urban Utilities. Complete the *Design Package Submission Form*.	SEQ Code Cl 1.2.5 (Water), Cl 1.2.2 (Sewerage)

5 Drafting Checklist

5.1 General drafting criteria applicable to all applications

No.	CRITERIA	REFERENCE
	All Drawings shall be prepared in accordance with the SEQ Code Asset Information Specification. Typical drawing presentation is included in the SEQ Code Standard Drawings.	
1	Title Block	Queensland Urban Utilities standard title block
	• Text consistent	
	• Fonts consistent	
	• Line work thickness consistent	
	• Revision number i.e. letter or number	
	• Project name consistent with documents	
	• Client company name preferably above project name.	
	• Title consistent drawing	
	• Funding by	
	• Drafted - Initial and Surname	
	• Drafting Check - Initial and Surname	
	• CADD File Number	
	• Queensland Urban Utilities application number	
	• Designed - Initial and Surname	
	• Design Check - Initial and Surname	
	• Design Certification - Initial and Surname, signature, RPEQ name/number, date	
	• Consultant's company details	
	• Revisions table including issue number, description; by, checked, RPEQ initials; and date	
	• Purpose of issue (such as "for approval"; "preliminary"; "(not) for construction"; etc.	
	• Endorsed consultant stamp shall be provided on all drawings certified under the Queensland Urban Utilities Minor Works certification scheme **(Minor Works only)**	
	• As-Constructed details	
	• North point	
	• Scales	
	• Bar scales	
	• Minimum size of text to be 3mm on an A1-sized plot	
2	Locality Plan Drawing	SEQ-WAT-1100-2 SEQ-SEW-1100-1
	• Key plan for projects requiring more than one detail plan	
	• Locality plan	
	• Scale and bar scale	
	• North point	
	• Drawing list (numbers and names)	
	• Cadastral boundaries	
	• Locality Plan shall be oriented north up.	
	• Minimum size of text to be 3mm on an A1-sized plot	
	• Layout of the scope of works with sufficient street names to easily locate the development	

No.	CRITERIA	REFERENCE
3	Notes Drawing	Refer Section 6 'Notes'
	• Relevant notes for civil projects	
	• Relevant notes for sewerage infrastructure	
	• Relevant notes for water reticulation infrastructure	
	North point, scale bars, standard notes provided reflect current specifications and standard drawings SEQ-WAT-1101-2, 1101-3, 1102-1. SEQ-SEW-1101-3	SEQ-WAT-1101-2, 1101-3, 1102-1. SEQ-SEW-1101-3
	Note on cover page of design specifying design complies with current SEQ Code and Queensland Urban Utilities requirements	
	Tables shown on the SEQ Code standard drawings for water reticulation and sewerage design shall be included in every drawing set, but can be on other than the Notes drawing	SEQ-WAT-1100-2, SEQ-SEW-1100-1, SEQ-SEW-1102-1
4	Variations from the SEQ Code: any variations to the SEQ Code, and the reason for the variation, shall be highlighted in a boxed note on the design drawings	SEQ Code Cl. 1.2.5 (Drinking Water) 1.3.3 (Sewerage)

5.2 Drafting Guidance Checklist – Water Reticulation

No.	CRITERIA	REFERENCE
1	**GENERAL**	
1.1	Site Plan Drawing	SEQ-WAT-1100-2 SEQ-WAT-1101-2
	• Project title	
	• Water main location	
	• Major street names	
	• Suburb names	
	• Creeks and rivers shown	
	• Scale	
	• North point	
	• Trench details	
	• Legend with all symbols shown differentiating existing and proposed infrastructure, including key fittings such as fire hydrants, valves, conduits, services.	
	• Survey data	
	○ File name	
	○ Point number	
	○ Easting	
	○ Northing	
	○ Surface level	
	○ Description	
	• For a staged development show the Water Approval application numbers for adjoining stages	
1.2	Notes Drawing	SEQ-WAT-1101-3
1.3	Detail Plan Drawings	SEQ-WAT-1101-2
	• Scale	
	• Street names/road carriageway/kerb lines/vegetation/other services	
	• Water main location and offset from property boundary	
	• Water service meters/road crossings/conduit details	
	• HDD section (if required)	
	• Pipe jacking section (if required)	
	• Tunnelling section (if required)	
	• Real property information	

No.	CRITERIA	REFERENCE
	• Horizontal bends with co-ordinates and chainages, thrust force and arrow showing direction	
	• Horizontal angles with co-ordinates and chainages	
	• Reticulation branches details	
	• Anchor block details	
	• Concrete surround	
	• Fire hydrants	
	• Air valve locations and air valve pit details (if required. Not required for reticulation mains)	
	• Scour valve locations and details. Not required in certain circumstances	
	• Marker post details	
	• Geotechnical borehole numbers and locations and a corresponding table of geotechnical test results	
	• Bench marks	
	• Easements	
	• Valve locations	
	• Valve pits	
	• Isolation valve location	
	• Cathodic protection details (if required)	
	• Existing water mains and sewers	
	• Existing valves	
	• Existing valve pits	
	• Existing third-party services' alignments (power, telecom, gas, stormwater, etc.)	
	• Significant trees (300mm DBH and more)	
	• Services warning signs	
	• Dimensioning, notes for special installation requirements, fittings lists, sequencing.	
1.4	Longitudinal Section Drawings (**if required**) Not generally required for water reticulation except for crossings of other services and obstructions, or where details are required	5.1.2; SEQ-WAT-1311-1, 1312-1, 1211-1, 1212-1, 1213-1
	• Limit of works	
	• Scale – vertical and horizontal	
	• Chainages	
	• Real property information	
	• Pipe diameter, material and class and wall thickness for MSCL	
	• Encased pipe section (if required)	
	• Socket direction	
	• Pipe grade	
	• Concrete surround	
	• Depth to invert	
	• Pipe embedment type	
	• Datum	
	• Invert levels	
	• Surface levels	
	• Chainage running	
	• Pipe invert and chainage at bends and angles	
	• Horizontal and vertical bends	
	• Existing services	
	• Proposed services	

No.	CRITERIA	REFERENCE
	• Services warning signs	
	• HDD section (if required)	
	• Pipe jacking section (if required)	
	• Tunnelling section (if required)	
	• Pipe List and special fittings e.g.	
	○ Pipe length	
	○ Pipe ends	
	○ Pipe numbers	
	○ Pipe special details	
	○ Couplings	
	○ Collars	
	○ Dead plates	
	○ Bends	
1.5	Live works connection details	

5.3 Drafting Guidance Checklist – Sewerage

No.	CRITERIA	REFERENCE
1	**GENERAL**	
1.1	Site Plan Drawing	SEQ-SEW-1100-1
	• Project title	
	• Sewer location	
	• Major street names	
	• Suburb names	
	• Creeks and rivers shown	
	• Scale	
	• North point	
	• Drawing numbers and titles	
	• Trench details	
	• Legend with all symbols shown, differentiating existing and proposed infrastructure, including maintenance holes, maintenance shafts, conduits, services.	
	• Survey Data	
	○ File name	
	○ Point number	
	○ Easting	
	○ Northing	
	○ Surface level	
	○ Description	
	• For a staged development show the Water Approval application numbers for adjoining stages	
1.2	Notes Drawing	SEQ-SEW-1101-3
1.3	Detail Plan Drawings	SEQ-SEW-1100-1
	• Scale and scale bar	
	• Sewer location and offset from property boundary	
	• Sewer bearing	
	• Street names/road carriageway/kerb lines/vegetation/other services	
	• Real property information	
	• Bench marks	
	• Maintenance structure locations and numbers	
	• Geotechnical borehole numbers and locations	
	• HDD section (if required)	
	• Pipe jacking section (if required)	

No.	CRITERIA	REFERENCE
	• Tunnelling section(if required)	
	• Existing sewers/maintenance structures	
	• Other existing and proposed services alignments including water, stormwater, power, telecom, gas, etc.	
	• Water service entry points and sewerage property connection points	
	• Proposed contours with labels	
	• Significant trees	
	• Property Connections and Lot Control Points	
	North point	
	Cadastral boundaries and Registered Plan (RP) descriptions	
	Stage boundaries if relevant, clearly differentiating currently-proposed works from existing and any future works	
	For staged works, show interim fittings for future connections	
	Building footprint in each allotment	
	Minimum size of text to be 3mm on an A1-sized plot.	
	Provide a legend differentiating existing and proposed infrastructure, including maintenance holes, maintenance shafts, conduits, services.	
	Dimensioning, notes for special installation requirements, fittings lists, sequencing.	
1.4	Longitudinal Section Drawings	SEQ-SEW-1101-1
	• Limit of works	
	• HDD section (if required)	
	• Pipe jacking section (if required)	
	• Tunnelling section (if required)	
	• Scale – vertical and horizontal	
	• Chainages	
	• Maintenance structure numbers (increasing upstream). Queensland Urban Utilities maintenance structure numbers shall be used when referencing existing manholes.	
	• Distance between maintenance structures	
	• Real Property information	
	• Pipe diameter, material and class	
	• Sewer grade	
	• Socket direction	
	• Datum	
	• Depth to invert	
	• Pipe embedment type	
	• Invert levels	
	• Surface levels	
	• Chainage running	
	• Existing services, crown or IL, clearances to proposed works, including for all existing water and sewerage, stormwater, power, telecom, gas, etc.	
	• Proposed services	
	• Services warning signs	

6 Notes

6.1 Standard Notes

The generic notes included in the SEQ Code standard drawings shall be included in every design package.

It is important to note, Queensland Urban Utilities has typically found the generic notes in the SEQ Code insufficient to fully prescribe all the construction requirements to contractors. Delays and re-work may be avoided where well-defined information is provided to the contractor by the consultant. It is necessary for the design drawings to include additional information to prescribe construction requirements without ambiguity. It is strongly recommended that construction requirements are clearly defined to avoid any misinterpretation by the construction contractor. The following examples should be included with the design package as standard notes (in addition to the SEQ Code standard notes) as a minimum. The consultant is encouraged to provide additional information to the contractor in the notes to describe any potentially ambiguous requirements related to the design, construction, or processes to minimise the potential for unsafe practices, delays and re-work:

6.2 Contractor Accreditation

During any construction activity at least one person on site must have completed a pipe laying training course approved by the pipe supplier or manufacturer and appropriate to the pipeline under construction. The training course must have been completed within the last ten years.

All site and factory PE welding shall be carried out by a person who has completed relevant nationally accredited training courses for butt welding/electrofusion and hold a valid welding certificate in accordance with Australian/New Zealand Standard 2033.

The contractor shall provide documented evidence of acceptable qualifications to Queensland Urban Utilities.

6.3 Workplace Health and Safety

All construction work shall comply with the requirements of the *Queensland Work Health and Safety Act 2011*. Contact the Division of Workplace Health and Safety for information by phone on 1300 362 128.

6.4 Water Main Construction Notes

1. *Construct embedment and trenchfill to SEQ-WAT-1200-2, 1201-1 TO SEQ-WAT-1204-1 (TYPE D support unless geotechnical investigations demonstrate that Type C support is adequate) and <either name council or Queensland Government Department of Transport and Main Roads (DTMR)> standards for roadway crossings, whichever is more onerous.*
2. *Provide bulkheads/trenchstops in accordance with SEQ Water Supply Code Table 7.5 AND SEQ-WAT-1209-1 and 1210-1.*
3. *Construct thrust blocks on all valves, bends, tees, tapers, dead ends, and transitions to unrestrained pipework to SEQ-WAT-1205-1 and 1206-1.*
4. *Construct small diameter property services to SEQ-WAT-1107-1 and 1107-3.*
5. *Install detectable marker tape on all water mains and property services.*
6. *Construct fire hydrants and stop valves to SEQ-WAT-1301-1, 1302-1, 1303-2, 1305-1, 1306-1 and 1409-1.*

7. *Construct scours to SEQ-WAT-1307-2 where necessary. Scours within Ipswich City Council region must discharge into an open stormwater gully pit, not to the invert of kerb and channel. Discharge to kerb and channel via a standard kerb adaptor through the face of the kerb is not accepted by Queensland Urban Utilities.*
8. *Install pavement markers to SEQ-WAT-1300-1 and 1300-2.*
9. *Construct test points to SEQ-WAT-1410-1 at the ends of all new mains before the scour and where required for commissioning purposes. Queensland Urban Utilities preference is to avoid tapping bands for test points and provide either a temporary (restrained) duckfoot hydrant or flanged short pipe with a temporary tapped blank flange. Testing against live mains and valves is not permitted.*
10. *Testing locations and temporary fittings are required on services over 10m long unless approved in writing for works to be undertaken as live works. Testing and as-constructed requirements to be documented on drawings.*
11. *316SS Backing rings shall be used with full-face PE flanges. PE stub-flanges are not accepted.*
12. *When joining to existing unrestrained pipelines, provide a DICL short pipe with thrust flange and thrust block. Bolt on uni flanges shall not be used as thrust flanges. Thrust (puddle) flanges shall be an approved prefabricated DICL/MSCL short pipe with prefabricated thrust flange.*
13. *AC mains shall be replaced collar-collar.*
14. *All disused services shall be plugged at the main and ferrule closed or tapping band removed and section of main substituted as live works. Large diameter services shall be disused by removing any property service pipework at the point of connection to the main (including valve), and installing a blank flange directly on the tee (or otherwise remove the tee altogether and replace with straight pipe).*
15. *Provide DN40PE (or DN32 CU) water services for road crossings servicing two dwellings. Provide DN32PE (or DN25 CU) water services for road crossings servicing a single dwelling. If the long-term static head of the property service is less than 350 kPa (35m) or if private booster is required, the minimum size of property service shall be 32 mm ID.*

6.5 Gravity Sewerage Construction Notes

1. *Construct embedment and trenchfill to SEQ-SEW-1200-2, 1201-1 TO 1205-1 (Type 4 support unless geotechnical investigations demonstrate that Type 3 support is adequate. Type 4 support to be used where migratory native soils (or sand or fine clay material) are encountered adjacent to the embedment zone and single size aggregate is used) and **<either name council or DTMR>** standards for roadways, whichever is more onerous.*
2. *Construct bulkheads and trench stops to SEQ-SEW-1206-1 and trench drains to SEQ-SEW-1207-1.*
3. *Construct MHs to SEQ-SEW-1301-1, 1301-2 and -3 (TYPE G), 1301-4 and -5 (TYPE F), 1301-6, -8, -10, -11 (TYPE X) 1304-1, 1305-1, 1307-4 (Stub cut-in), 1313-1 (Connection) and 1502-1 (Insertion MH and repair system), 1301-12 (Ladders).*
4. *Construct maintenance shafts and terminal entry point to SEQ-SEW-1315-1 and 1316-1 and 1502-1 (Insert MS).*
5. *Install MH/MS TYPE B covers to SEQ-SEW-1308-2 to 1308-7.*
6. *Install MH/MS TYPE D covers to SEQ-SEW-1308-8 to 1308-11.*
7. *Construct property connections to SEQ-SEW-1106-1 to 1106-6.*
8. *Install detectable marker tape on all sewer mains and property connections.*

The requirement for PE lining of manholes must be noted where required in SEQ CODE clause 7.6.2 and 17.2.6.

Concrete for MH construction shall be special class to WSA PS-358 with requirement for calcareous aggregate.

Pre-cast manholes are not accepted within the Queensland Urban Utilities' service area (except as formwork).

6.6 Building Over or Adjacent to Queensland Urban Utilities Assets

While assessment and approval of Building Over or Adjacent to Assets (BOA) is not part of the Queensland Urban Utilities Water Approval process, it is important that BOA design requirements are considered and incorporated as part of the design of the Queensland Urban Utilities water and sewerage infrastructure.

BOA requirements are managed under separate legislation and review and approval processes, prescribed in MP1.4 and the SEQ Code that must be addressed in the design, and shown on the Design Package. The designer is required to consider future BOA implications as part of the design process for Queensland Urban Utilities infrastructure to prevent re-design/re-construction of the infrastructure in the future.

Applicants are reminded they must obtain a separate BOA approval if required. Please refer to the Queensland Urban Utilities website for further information. Please note, endorsement of the design materials as part of the Water Approval process does not infer satisfaction of BOA criteria.

It is the responsibility of the developer/designer/contractor to ensure works do not adversely impact Queensland Urban Utilities infrastructure, and costs to rectify damage will not be incurred by Queensland Urban Utilities.

If the sewer crosses under a retaining wall and/or within the zone of influence of a retaining structure, an RPEQ certification must be provided to Queensland Urban Utilities verifying the structural integrity of the sewer. Where the sewer crosses under a boulder retaining wall, a concrete bridging slab shall be placed over the sewer and a RPEQ certificate provided to Queensland Urban Utilities for the slab design and the integrity of the sewer.

6.7 Live Works

All live works must be undertaken by the developer's licensed contractor in accordance with a valid Queensland Urban Utilities' Network Access Permit, under the supervision of Queensland Urban Utilities, at the developer's expense.

Pre-chlorinated fittings shall be used for water supply live-works connections.

Live works may not commence until all relevant test certificates have been provided to and accepted by Queensland Urban Utilities, and all adjoining works have been accepted by Queensland Urban Utilities.

The design drawings shall include connection details for all live works.

6.8 Construction of Infrastructure 'For Convenience'

In some circumstances, a design may include a plan to construct infrastructure for future development that is not a condition of a Water Approval, but is proposed to be constructed 'for convenience' to avoid disturbance to other infrastructure in the future. In such cases, the drawings

must show that the infrastructure proposed 'for convenience' is *not* permitted to be connected until a subsequent Water Approval is obtained from Queensland Urban Utilities.

Owing to the complexities and case-by case nature of these scenarios, the developer/consultant is recommended to contact Queensland Urban Utilities in advance to discuss options by lodging a request for a Services Advice Notice. Infrastructure constructed 'for convenience' is at the developer's risk and may need to be reconstructed at the developer's expense in the future to meet design standards that are current at that time. Queensland Urban Utilities reserves the right to refuse any infrastructure that has been constructed 'for convenience' for which a Water Approval has not been obtained.

6.9 Connection to infrastructure that has not been accepted by Queensland Urban Utilities

If a design proposes a connection to infrastructure that has not been accepted by Queensland Urban Utilities , the live-works *may not commence* until the adjoining infrastructure is accepted by Queensland Urban Utilities. This is particularly important for staged applications and/or applications where adjoining developments are constructing new infrastructure simultaneously. A note shall be added to all drawings where this applies:

'This design shows connection to infrastructure that has not been accepted by Queensland Urban Utilities. Live-works cannot commence until the adjoining works have been accepted by Queensland Urban Utilities .'

Queensland Urban Utilities does not negotiate on behalf of developers to deliver adjoining infrastructure provided by others. It is the developer's responsibility to undertake any necessary negotiation with other parties that have the potential to affect their work.

The developer must be aware of any risks or consequences involved with these scenarios and proceed accordingly at its own risk.

6.10 Site Investigation and Services Location.

Queensland Urban Utilities recommends site and geotechnical investigations such as detail surveying, service locating, potholing and ground penetrating radar (GPR) and DCP tests be undertaken as part of the design process to locate and validate the location of all relevant services and check ground conditions. These processes shall be carried out as part of the design to avoid the need for variations to the design during construction. Usual Queensland Urban Utilities timeframes apply for the assessment of every design iteration. Queensland Urban Utilities accepts no liability for any delays associated with insufficient site investigation and services location by the designer.

6.11 Liability

Queensland Urban Utilities supplied data is indicative and approximate only and provided without warranties of any kind, express or implied including in relation to accuracy, completeness, correctness , currency or fitness for purpose. Queensland Urban Utilities takes no responsibility and accepts no liability for any loss, damage, costs or liability that may be incurred by any person acting in reliance on the information provided by Queensland Urban Utilities.

Queensland Urban Utilities' as-constructed information should be used as guide only. Any dimensions should be confirmed by site surveys.

6.12 Copyright

Queensland Urban Utilities or third parties own and retain the copyright and other intellectual property rights in any information supplied by Queensland Urban Utilities or its officers, including without limitation documents, text, designs and graphics; and their use is subject to the *Copyright and Trade Practices Act 1974*.

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7 Water Reticulation

The design requirements in the following tables shall be addressed by the designer. These tables are *not* intended to be a comprehensive list of all design requirements or considerations. Please refer to the SEQ Code and other Queensland Urban Utilities' technical requirements for further information.

Clause numbers refer to the *SEQ Water Supply Code Version 1.2 2018* unless noted otherwise.

7.1 Design Guidance Checklist – Water Reticulation

No.	CRITERIA	REFERENCE
2	**WATER MAINS**	
2.1	**Pipe Alignment/Layout**	
2.1.1	Water mains shall be located within the road reserve allocated service corridor at the standard offset nominated by the road owner. Where the alignment is outside the allocated Queensland Urban Utilities corridor, provide evidence of approval from the road owner to Queensland Urban Utilities. Where infrastructure is proposed within Queensland Government or QR property, obtain and provide evidence of approval from relevant authority to Queensland Urban Utilities (if another service provider's allocated corridor is affected, approval is also required from that service provider).	Refer council Standard Drawings for road allocation. Refer to Queensland Government and QR SEQ Code cl 5.4.2
2.1.2	Water mains shall be located on the opposite side of the road reserve to the sewer wherever practicable.	5.4.2.2
2.1.3	Where practicable, fire hydrants and water service connection points are not to be located at the same property boundary as electrical service connection points, electrical pillar boxes. Show the electrical layout on the water reticulation drawings (or provide the electrical layout drawings separately) to demonstrate compliance.	5.11.5, 5.11.8
2.1.4	Water main dead ends shall be maximum 2.0m past the last property connection point and located so that it is not built over by a driveway.	5.10.1
2.1.5	Joint deflections are not permitted to achieve pipe deviations. Use PE, DICL bends or welded SCL pipes to provide pipe deviations.	5.12.6.1, 5.12.6.2
2.1.6	Water mains shall be provided on both sides of the road in industrial areas.	5.7
2.1.7	Where a water main was originally laid in a verge but with road widening would be in the carriageway, or a proposed road would result in an existing main being located under a carriageway, the water main shall be relocated to an appropriate alignment and constructed in an appropriate material for the location. Any development works that change the level of cover/loading condition over existing infrastructure will require the existing infrastructure to	5.4.2

No.	CRITERIA	REFERENCE
	be relocated to meet current standards.	
2.1.8	Check pressure zone boundaries. New Boundary Valves must be installed if a development interconnects different pressure zones. Valve colouring shall be per SEQ Code standard drawings SEQ-WAT-1300-1, 2. Minimise the number of Boundary Valves and Dead Ends between pressure zones.	8.2.7.4, SEQ-WAT-1300-1, 2
2.2	**Easements**	5.4.4
2.2.1	Permanent Queensland Urban Utilities water mains are not permitted within private property. Temporary water mains may be located within private property subject to Queensland Urban Utilities approval and provision of an easement in favour of Queensland Urban Utilities.	Table 5.2
2.2.2	An easement shall be provided over Queensland Urban Utilities temporary water mains located anywhere other than council road or Queensland Urban Utilities owned land:	Table 5.2
2.2.2.1	• ≤300NB – Minimum 6.0m easement	Table 5.2
2.2.2.2	• >300NB – Minimum 10.0m easement	Table 5.2
2.2.3	Refer Queensland Urban Utilities Easement Guidelines for further information.	Easement Guidelines
2.3	**Pipe Size**	
2.3.1	Pipe sizes shall comply with hydraulic modelling results to satisfy SEQ Code Design Criteria and the Conditions of the Water Approval.	SEQ Code Design Criteria
2.3.2	Minimum water main sizes: (Note: Larger sizes may be necessary to satisfy SEQ Code Design Criteria flowrate requirements. If a larger size is necessary to satisfy SEQ Code flowrate requirements, the larger size shall be provided).	Table 3.1
2.3.2.1	• Low and medium density residential: DN100 (DN125PE)	
2.3.2.2	• High density residential (>4 storeys) : DN150 (DN180PE)	
2.3.2.3	• Multiple high density residential (>8 storeys): DN200 (DN250PE)	
2.3.2.4	• Industrial and commercial: DN150 (DN180 PE).	
2.3.3	DN63 PE may be used as reduced mains in cul-de-sacs with not more than 10 water service connections, and subject to FH spacing requirements.	5.2.4, 8.8.8, SEQ-WAT-1104-1

No.	CRITERIA	REFERENCE
2.4	**Materials**	
2.4.0	All materials shall comply with the requirements of the SEQ Code Infrastructure Products and Materials (IPAM) list.	SEQ Code Infrastructure Products and Materials (IPAM)
2.4.1	Water mains shall be PE100 PN16 unless site conditions require an alternative material. Trenchless construction methods may require higher pipe class. Alternative materials e.g. DI, MS may be necessary in non-standard situations and at transitions to existing materials to facilitate thrust restraint. MS shall be specified by pipe OD and wall thickness per SEQ Code IPAM list.	IPAM
2.4.2	PE welding and connection requirements shall be as per Cl 4.5. PE flanged connections shall use full-face PE flanges, not stub-flanges.	4.5
2.4.3	Where a proposed road crosses an existing AC main (or main of any other material not approved by Queensland Urban Utilities to be located under a road), the main shall be relocated and replaced with an approved material at the appropriate cover for the road.	5.4.2.1
2.4.4	For trenchless installations PE shall be joined by butt-welding only, electrofusion couplings not accepted. Higher class pipe is required for trenchless installations.	IPAM
2.4.5	Where it is necessary to concrete encase a section of plastic pipe material, a heavy duty 3mm thick polyethylene material shall be placed between the concrete and the PE pipe to minimise imposed loadings particularly where the pipe emerges from the concrete block.	7.6.1
2.5	**Pipe Cover**	7.4.2 and Table 7.2
2.5.0	The minimum cover shall be provided in accordance with the values stated in the SEQ Code *and* the requirements of the road owner, whichever is greater.	
2.5.1	In a road carriageway, the depth of cover is measured from the road shoulder or lip of kerb. Elsewhere the cover shall be provided at the FSL. If the footway cross fall is non-standard, i.e. greater than 1 in 50, a cross-section at a scale of 1:50 shall be provided with the Design Drawings. Where site works will reduce the depth of cover below the required pipe cover, the main shall be redesigned to provide the required cover.	7.4.2
2.5.2	Minimum cover for water mains <200mm NB (< DN250PE) in the SEQ Code are:	7.4.2, Table 7.2, SEQ-WAT-1200-2

No.	CRITERIA	REFERENCE
2.5.2.1	• Non-trafficable areas, driveways, verges/footways, carriageways of sealed local roads – 600mm	7.4.2
2.5.2.2	• Carriageways of unsealed roads – 750mm	7.4.2
2.5.2.3	• Carriageways of major roadways/embankments/commercial and industrial Areas) – 750mm (unless greater cover is required by road owner e.g. council, Queensland Government)	7.4.2
2.5.2.4	• Carriageways of motorways/freeways – 1200mm (unless greater cover is required by road owner.)	7.4.2
2.5.2.5	• QR corridors – in accordance with SEQ Code, AS4799 and QR requirements.	SEQ-WAT-1213-1, AS4799, QR
2.5.3	Minimum cover for water mains >250mm NB (>DN315 PE):	7.4.2
2.5.3.1	• All locations except carriageways of motorways/freeways – 1000mm (unless greater cover is required by council or road owner).	7.4.2
2.5.3.2	• Carriageways of motorways/freeways – 1200mm (unless greater cover is required by council or road owner).	7.4.2
2.5.4	Maximum depth to invert shall not exceed 1.5m for reticulation mains (< 300 NB). For mains >300mm NB the maximum pipe cover shall not exceed 1.5m unless special design is submitted and approved.	7.4.2
2.5.5	Water services	
2.5.5.1	• <DN63 PE: 300mm minimum cover in footway, 600mm minimum cover under roadways (to the conduit, measured from the lip of kerb), unless overridden by the relevant road authority	5.11.7
2.5.5.2	• >DN63 PE: cover as for same sized water mains	5.11.7
2.6	**Clearances to other services (water, sewer, stormwater, telecoms, power, gas etc.)**	
2.6.1	Minimum vertical clearances to other services shall be:	5.12.5.2 and Table 5.5
2.6.1.1	• Sewer – 500mm	
2.6.1.2	• Stormwater ≤300– 150mm	
2.6.1.3	• Stormwater >300– 300mm	

No.	CRITERIA	REFERENCE
2.6.1.4	• Water main ≤375 NB – 150mm	
2.6.1.5	• Water main >375 NB – 300mm	
2.6.1.6	Refer Table 5.5 for other services.	
2.6.2	Water mains (including water services and fire hydrant off-takes) should always cross over above sewers, stormwater drains, gas mains and electrical conduits unless written approval is obtained from Queensland Urban Utilities.	Table 5.5
2.6.3	Where water mains pass under other services, provide construction details as noted in Table 5.5 Note 4.	Table 5.5
2.6.4	Minimum horizontal clearance to other services shall be:	5.12.5.2 and Table 5.5
2.6.4.1	• Sewer – 1000mm (at minimum vertical clearance - 600mm at 750mm vertical clearance)	
2.6.4.2	• Stormwater – 300mm if new water main is <200 NB	
2.6.4.3	• Stormwater – 600mm if new water main is >200 NB	
2.6.4.4	• Water ≤375 NB – 300mm (600mm if new water main is >200 NB)	
2.6.4.5	• Water >375 NB – 600mm.	
2.6.4.6	Refer SEQCode Table 5.5 for clearances to other services.	Table 5.5
2.6.5	Clearances from trees.	5.4.13
2.6.6	Clearances from structures. Water mains shall be located with sufficient clearance to structures to allow for maintenance and operation activities and provide protection against damage from pipeline bursts.	5.12.5.2, MP1.4, Build Over Asset Criteria
2.7	**Valves**	
2.7.1	Provide sufficient stop valves to limit the size of the shut-off area when a main is taken out of service for operational purposes. Spacing criteria:	8.2
2.7.1.1	• Stop valves may not be required on a 100 ID main leading from a 100mm or 150mm ID main where no more than 20 residential lots are serviced (single residential dwellings only).	8.2.4
2.7.1.2	• Mains ≤150 NB – maximum 40 properties serviced or every 200m.	Table 8.2
2.7.1.3	• Mains 200-300 NB – maximum 100 properties serviced or every 300m.	Table 8.2

No.	CRITERIA	REFERENCE
2.7.1.4	• Where a single water service is to be provided for multi-unit developments beyond the number of properties in SEQ Code Table 8.2, *and/or* for commercial/industrial development, a valving arrangement for two-directional supply shall be provided at the connection point to ensure supply can be maintained to the development from either direction.	8.2.4, 8.2.8, Figure 8.14
2.7.1.5	• No more than two reticulation branches shall be located between stop valves.	8.2.4
2.7.2	Provide fittings for future main extension per SEQ-WAT-1303-2.	SEQ-WAT-1303-2
2.7.3	Zone Boundary Valves shall be clearly identified on design drawings. Arrangement between pressure zones shall be as per Cl8.2.7.4 Option (A) or (B) to suit the specifics of the valve location. Fire Hydrants (FH) supplied from higher pressure zone. Closed SV marked as Zone Valve as per SEQ-WAT-1300-1, 1300-2.	8.2.7.4, SEQ-WAT-1300-1, 1300-2
2.7.4	Check requirement and location of Air Valves (AV) (AVs are generally required for water mains >300 NB only. FHs are typically used on reticulation mains <300 for air release in lieu of AVs). Note: Preferred Queensland Urban Utilities air valve arrangement is Queensland Urban Utilities drawing 486/4/6-0057-015, *not* standard drawing in the SEQ Code (trunk mains only).	8.4.2
2.8	**Fire Hydrants (FH)**	8.8
2.8.1	FHs shall be installed at maximum 80m spacing, and 40m maximum from property boundaries. In Urban areas, a FH is required within 90m of the furthest point of any existing, proposed or future Class 1 dwelling. Assume worst case future building envelope to ensure FH coverage for all possible building locations. FHs shall be located in-line with the side real property boundary and clear of driveways. Existing FHs (valves and scour assemblies) within existing or proposed driveways must be relocated clear.	8.8.8, 8.8.9
2.8.2	Hydrant tees and risers shall be DN100 NB with DN100 flanges. For PE systems the PE flange to the FH shall be full face with SS316 backing rings and the bolting configuration shall match the DN100 flange on the FH. Hydrant saddles or hydrant tees to the main shall be fully-welded connections.	8.8.7
2.8.3	FHs shall be provided at high and low points for air release and scouring purposes.	8.4.6, 8.8.8 (c)
2.8.4	Hydrants shall not be installed on permanent ends of mains smaller than DN100 (<DN125 PE).	5.10.1

No.	CRITERIA	REFERENCE
2.8.5	Flushing points are required on all mains where hydrants or scours are not provided.	5.10.4, SEQ-WAT-1104-1, 1104-2
2.8.6	Permanent or temporary Dead Ends shall be fitted with a FH (or duck-foot FH).	SEQ-WAT-1303-2
2.9	**Scours**	8.6
2.9.1	Queensland Urban Utilities does not require scour assemblies on all main sizes. Queensland Urban Utilities only requires scours for water mains >200 NB. FHs shall be provided in lieu of scour assemblies for water mains ≤200 NB. Where a scour is required the detail shall be as per SEQ-WAT-1307-2, 1104-2.	8.6.1, SEQ-WAT-1104-2, 1307-2
2.9.2	Scours in Ipswich City Council (ICC) region shall NOT discharge to kerb and channel. Scours in the ICC region are to be directed into an open-grated stormwater chamber or pump-out chamber. (For ICC, scour locations shall be designed in coordination with stormwater gully locations to avoid discharge to kerb and channel.)	ICC requirement
2.9.3	A FH shall be provided immediately adjacent to a scour to allow water drained from mains to be captured in tankers.	8.6.2
2.10	**Flushing Points**	
2.10.1	A flushing assembly shall be installed on the end of water mains. For Queensland Urban Utilities a FH shall be provided as the flushing point at the end of each water main (mains >= DN100 NB only). Provide flushing points for mains <=DN100 NB per SEQ-WAT-1104-2.	5.10.1, 5.10.4, SEQ-WAT-1104-2
2.11	**Property Services**	5.11
2.11.1	Single residential lots shall be serviced by a 20mm ID service (25mm ID service by request). Note: For road crossings the size needs to be increased to account for the increased headloss associated with the increase length of road crossings. **Water Service Sizing** For single residential properties on the same side of the road as the water main use: DN25 PE (or DN20 Cu) servicing a single dwelling, or	5.11.6, SEQ-WAT-1107-1, 1107-2

No.	CRITERIA	REFERENCE
	DN32 PE (or DN25 Cu) servicing two dwellings. For road crossings use: DN32 PE (or DN25 Cu) servicing a single dwelling DN40 PE (or DN32 Cu) servicing two dwellings Refer SEQ-WAT-1107-1, 1107-2 for small diameter water services and conduits. For development other than single residential dwellings the water services/meters shall be sized by the hydraulic consultant to suit the demand requirements of the development. Queensland Urban Utilities may impose conditions on the property connection to limit the effect on surrounding customers.	
2.11.2	Water services (<DN63PE or equivalent) which are located under existing or future roadways, concrete or paved driveways, footpaths, bikeways or other hard standing areas, shall be installed in a solvent welded DN100 PVC conduit. The conduit shall have a maximum length of 25m and extend 300mm beyond the back of the kerb or concrete/paved area. Conduits shall not be installed in the same trench as electrical cables. Brass/stainless steel markers indicating the service or conduit location shall be placed on the kerb or concrete/paving edge.	5.11.6
2.11.3	Fire Services size, material, metering. Extent of Queensland Urban Utilities asset: All pipework within private property is private plumbing (excluding the Queensland Urban Utilities meter assembly). The meter assembly is owned by Queensland Urban Utilities and shall be shown on the drawings at the proposed location. The limit of Queensland Urban Utilities/private assets shall be clearly noted on the drawings. Sizing of large services shall be undertaken by the consultant to suit the development's hydraulic requirements. Thrust restraint: Large services shall be fully restrained on the Queensland Urban Utilities property connection assuming that the pipework on the private plumbing may not be fully-restrained. Thrust restraint shall be provided as per the SEQ Code standard drawings with the thrust arrow and thrust forces clearly specified.	8.8.12 Standard water meter arrangement drawings
2.11.4	Water services > 100mm NB shall be constructed using DICL, MS, 316SS, or PE.	5.11.9

No.	CRITERIA	REFERENCE
2.11.5	A stop valve shall be installed on the water property connection immediately adjacent to the main to minimise the disruption to surrounding customers if the property connection needs to be isolated.	
2.11.6	Stop valves shall be provided on Queensland Urban Utilities water mains either side of a property connection branch to developments where the number of customers exceeds the number shown in SEQ Code Table 8.2 and/or for critical commercial/industrial customers to ensure that flow can be configured in the network to maintain supply from either direction in the event of a service interruption on the water main either side of the property connection.	8.2.4, 8.2.8, Figure 8.14
2.11.7	Water services parallel to the footpath and/or property boundary are not permitted.	5.11.5
2.11.8	Water services shall only be installed to water reticulation mains <300mm NB.	5.11.1
2.11.9	Water meters shall be located clear of driveways.	5.11.4
3.0	**Live Works (Connections to Existing Water Mains)**	5.9, 19, 22
3.1	Drawings shall include details of the live works connection and fittings list. All works on the existing reticulation system shall be considered as "live-works" and will be controlled by the SEQ-SPs or their designated agent at the developer's cost. These works shall be clearly delineated on the Design Drawings and shown in sufficient detail such that the works can be readily constructed. Live works cannot commence until the new network infrastructure has been tested, passed and accepted. The design shall be prepared to ensure that the new works can be fully-tested before live-works commence. All live works pipework shall be pre-chlorinated. The extent of live works should be minimised to ensure efficient construction and to minimise loss of water supply to the public and to enable the majority of the works to be constructed and tested off-line independently of existing infrastructure. For complex substitutions, temporary valves and/or hydrants may be required. Hydrant coverage requirements to be maintained during construction, which may require temporary mains and/or temporary fittings. The requirement to provide temporary and/or permanent hydrants used for charging and testing of new mains shall also be considered.	5.9, 19, 22
3.2	Detail to note that level and alignment of new main to suit location and depth of existing main.	

No.	CRITERIA	REFERENCE
3.3	Ensure drawings contain the note: "All live-works shall be undertaken by the contractor in accordance with a valid Queensland Urban Utilities Network Access Permit."	
3.4	Live works on AC water mains shall include removal of existing AC main from collar to collar.	
3.5	Where an under-pressure cut-in connection is proposed, the additional requirements for under-pressure cut-in connections must be addressed. Provide certification to Queensland Urban Utilities for the additional requirements associated with under-pressure cut-in connections.	Under Pressure Cut-in Connection Additional Requirements
4.0	**OTHER**	
4.1	If Acid Sulfate Soils (ASS) are likely to be encountered an approved acid sulfate soil management report strategy shall be referenced on the drawings. Provide notes on drawings as required.	5.1.4
4.2	Provide note on drawing if scope of works is within Fire Ant Zone (or any other invasive ant declared area). Management and disposal of soils should be carried out as per the relevant authorities requirements.	5.1.4
4.3	Developer/contractor is responsible for obtaining any necessary permits associated with vegetation removal/management. Provide details to Queensland Urban Utilities that the works have been designed in accordance with any environmental requirements.	5.1.4
4.4	Detail treatment of existing disused water mains where applicable e.g. grout-filled, removed or disused. Existing disused AC mains shall be removed.	11.5.2
4.5	Does any proposed development work (earthworks, retaining walls, road works, drainage, sewer or water, etc.) affect any existing/proposed Queensland Urban Utilities infrastructure? Any works that directly or indirectly impact the existing Queensland Urban Utilities network are to be carried out in accordance with a valid Network Access Permit. The design shall include where existing Queensland Urban Utilities infrastructure needs to be re-constructed as a result of development activity (e.g. relocation of mains, valves, hydrants, scours etc.).	Water Approval condition
4.6	Boring under major roadways as per SEQ-WAT-1212-1 and 1214-1, and the requirements of the road owner.	SEQ-WAT-1212-1, 1214-1
4.7	Bulkheads and trenchstops shall be shown on the drawings at the spacing necessary to suit the pipe grade.	7.10, SEQ-WAT-1209-1

No.	CRITERIA	REFERENCE
4.8	Property owner's consent shall be provided to Queensland Urban Utilities for all affected properties.	Water Approval condition
4.9	Thrust block provided on all bends, tees and dead ends as per Std Drgs SEQ-WAT-1205-1, 1206-1 and 1207-1. Thrust restraint is generally not necessary for fully-welded PE water mains, but thrust restraint is required to be provided at locations where PE transitions to unrestrained materials e.g. unrestrained Queensland Urban Utilities pipework or private plumbing. Push-on PVC or DICL directly connecting to PE without appropriate restraints on the transition area is not permitted.	7.9.6.5
4.10	Detectable marker tape shall be specified for installation on all water mains and property services.	5.4.16.2, 5.4.16.3
4.11	Pavement markers shall be installed as per SEQ-WAT-1300-1 and 2.	SEQ-WAT-1300-1 and 2
4.12	Backflow prevention shall be addressed as part of the requirements of the private plumbing to protect the Queensland Urban Utilities network.	2.6.2. AS3500
4.13	Chlorination assemblies are required on all mains >=DN225. Hydrants and/or test points may be used as chlorination assemblies. Test points as per SEQ-WAT-1410-1 shall be constructed at the end of all new mains before the scour and where required for commissioning purposes.	5.10.3, SEQ-WAT-1410-1
4.14	Embedment type must be specified on drawings (Type 4 support unless geotechnical investigations demonstrate that Type 3 support will be adequate in verge. Other types may be necessary to suit site conditions or to satisfy the requirements of the road owner. The designer shall specify the required embedment type on the drawings).	SEQ-WAT-1201-1, 1202-1, 1203-1, 1204-1

7.2 Under Pressure Cut-in Connection Additional Requirements

Under-pressure cut-in connections (UPCIC) are accepted by Queensland Urban Utilities in certain circumstances for drinking water property connections to minimise disruption to surrounding customers. Additional design and certification requirements apply. Queensland Urban Utilities will assess all requests for property connections ≥DN100 on a case-by-case basis, subject to additional certification requirements.

An UPCIC is not feasible if valves need to be installed on the water main either side of the property connection tee. Valves may be required on the water main either side of the tee to accommodate flow from either direction to maintain supply to a property in the event of a failure of the water main either side of the property connection. Refer SEQ Code clause 8.2.4, 8.2.8, Table 8.2 and Figure 8.14 for valve requirements.

An UPCIC create a potential restriction to the supply to the branch of the tee due to the size of the hole in the main being smaller than a cut-in tee arrangement.

Additional certification is required from the certifying RPEQ to accept responsibility for the limitations of the UPCIC methodology, i.e:

1. RPEQ certification that hydraulic capacity assessment has been undertaken and hydraulic requirements have been satisfied:

    - Restriction due to size of drilled hole, as well as further restriction due to plastic inserts for metallic pipes (where relevant), have been incorporated in hydraulic assessment.

2. RPEQ certification that existing host pipe condition and arrangement is suitable for proposed connection works:

    - Condition and arrangement of host pipe at connection point and surrounding area must be physically confirmed and certified by RPEQ that:

        - Host pipe is in suitable condition for tapping/UPCIC works, with no significant corrosion, cracking, pitting, surface damage or shape distortion

        - Installation of proposed UPCIC satisfies the following spacing requirements from other connections, tapping bands/saddles, pre-tapped connections and pipe joints:

Host Pipe Material	Host Pipe Size (mm)	Minimum Spacing (mm)
PE	< DN 355	500
DI, DICL, CI, CICL, SCL	< NB 300	600
PVC-m, PVC-u, PVC-o#	< DN150	600
	> DN150 to < DN 300	900

UPCIC of PVC-o is not accepted

Refer to SEQ Code clause 5.11.2 for further details.

- Installation of proposed UPCIC satisfies the requirements of Section C3.3 in Water Services Association of Australia (WSAA) Appendix C – Under Pressure Cut-in Connection to Pressure Pipes > DN 80 (WSA-03-2011- v3.1).

3. Proposed Connection Detail/s and Construction Methodology clearly shown on design drawings:

    - Design drawing/s must clearly:

        - show proposed connection detail/s

        - state proposed connection and construction methodology to be used

        - list Queensland Urban Utilities accepted fittings to be installed

        - state the minimum length of off-take clamp to be installed (where relevant)

- state the proposed host pipe drill hole size (where relevant)
- state that plastic insert is to be installed in drilled hole of metallic host pipe (where relevant) and associated plastic insert thickness
- state the proposed connection hole size (where relevant)
- state the proposed connection hole size adopted for RPEQ certified hydraulic modelling of property service and/or fire supply (where relevant).

4. RPEQ certification that design satisfies relevant Queensland Urban Utilities Standards and requirements.

7.3 Infrastructure with less than minimum allowable cover

In brownfield locations the following points shall be considered when minimum cover cannot be achieved:

1. Water mains and water services shall cross over sewers, stormwater drains, gas mains and electrical conduits and comply with minimum cover and clearance requirements.
2. Where there is no alternative and the water main is shallower than minimum allowable cover, use fully welded MSCL (without flanges). Queensland Urban Utilities requires minimum cover as per SEQ Code and does not permit flanges or fittings within the pavement box, or at a depth that is likely to be susceptible to damage in the event of future road pavement/verge construction/rehabilitation.
3. Flanged joints shall not be encased in concrete.
4. Prefabricated MSCL pipework is preferred to maximise the quality of reinstatement of the cement lining and coating at joints.
5. MSCL under other services shall be concrete encased with minimum 150mm thick concrete encasement, with a further minimum 150mm (300mm desirable) clearance to services. Services with depth to invert over 1.50m shall be fully concrete encased. Concrete encasement shall stop nominally 300mm before flanges to allow for maintenance access.
6. MSCL work shall be undertaken by a licensed contractor experienced in welding of pressure pipelines. Contractor accreditation shall be provided.
7. Provide a test point at each end of the complete crossing.
8. Protection methods to electrical infrastructure shall incorporate the requirements of AS/NZS 3000 and Energex.

8 Sewerage

The design requirements in the following tables shall be addressed by the designer. *The following tables are NOT intended to be a comprehensive list of all design requirements or considerations. Refer to the SEQ Code and other Queensland Urban Utilities technical requirements for further information.*

Clause numbers refer to the *Gravity Sewerage Code of Australia – South East Queensland Service Providers Edition Version 2.0 (July 2019)* unless noted otherwise.

8.1 Design Guidance Checklist – Sewerage

No.	CRITERIA	REFERENCE
2	**SEWER MAINS**	
2.1	**PIPE ALIGNMENT / LAYOUT**	
2.1.1	Sewers shall be designed to service the development taking into consideration the surrounding topography and the requirements to accommodate future extension. Where a sewer exists that can service the proposed development, connection to it is preferred rather than placing a new sewer on the opposite side of the road. Wherever practicable, sewers shall be located in the sewer allocation within the road reserve on the high side of road and opposite to water reticulation in accordance with council's allocated corridor for Queensland Urban Utilities' assets and preferred standard alignment. Where this is not practicable, the following alternatives may be considered:	Refer council Standard Drawings for Road Allocation. SEQ Code cl 5.2.3, 5.2.4, 5.3
2.1.1.1	• Another alignment with the approval of the relevant utility provider and road owner.	5.2.3, 5.3.2
2.1.1.2	• Along drainage reserve	5.2.3
2.1.1.3	• Road carriageway	5.2.3, 5.3.2
2.1.2	Sewers located within residential properties shall be offset 1.0m to 1.5m from the property boundary with preference for the larger offset.	5.2.4
2.1.3	Where a sewer and a stormwater drain traverse a lot on the same side of the building envelope, the sewer should be closer to the building envelope than the stormwater.	5.2.4

No.	CRITERIA	REFERENCE
2.1.4	Sewers in industrial areas shall be located in the road reserve unless topography does not permit. Where a sewer is located along the side or rear boundary of an industrial property and it is possible the sewer will be built over, the sewer should be positioned 2m to 4m from the boundary.	5.2.4.5
2.1.5	Sewers shall not be located between front of property boundary and standard setback for building works.	5.2.4.1
2.1.6	Sewer mains shall be provided to upstream property boundaries at a reasonable depth to command upstream catchment and accommodate future development.	Water Approval Conditions
2.1.7	All sewer maintenance structures and property connections shall be located clear of structures, be unobstructed, allow for future maintenance and have unrestricted street access at all times.	MP1.4, cl 6.5.3
2.1.8	Horizontal curves in sewers:	5.3.8
2.1.8.1	• Maximum of two Long Radius Bends (LRB) between adjacent maintenance structures.	5.3.8
2.1.8.2	• Maximum deflection angle for a LRB is 90 degrees. The maximum cumulative horizontal angle permitted on a sewer line between any 2 maintenance structures is 90 degrees.	5.3.8
2.1.8.3	• Curves are not permitted to be located under a road carriageway.	5.3.8
2.1.8.4	• Sewer connections to be placed on straight sections of sewer.	5.3.8
2.1.8.5	• Short Radius Bend (SRB) are not permitted.	5.3.8
2.1.8.6	Horizontal bends shall not be used in combination with vertical or compound bends between adjacent maintenance structures.	5.3.8
2.1.8.7	Minimum LRB radius is 35 times outside diameter of a SDR21 PE pipe. Refer to POP202.	5.3.8. POP202
2.1.8.8	Bend radius to match road curvature (provided bend radius limitations not exceeded).	5.3.8

No.	CRITERIA	REFERENCE
2.1.9	The impact of proposed sewerage infrastructure on existing/future buildings or structures must be taken into account. Sewer to be constructed clear of 'Zone of Influence' of structures. Obtain separate BOA approval as required.	5.2.4, MP1.4
2.1.10	Bridging details to be provided where applicable.	5.4.4
2.1.11	Clearances to other services as per SEQ Code Table 4.2. Reduced clearances to other services only by consent.	Table 5.4
2.1.12	Sewers crossing a water main >300 NB to have details shown.	5.4.5.1
2.2	**EASEMENTS**	Queensland Urban Utilities Easement Guidelines and SEQ Code clause 5.2.8
2.2.1	Easements shall be provided in accordance with Queensland Urban Utilities requirements. Easement details must be shown on the design drawings.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8
2.2.1.1	• Easements are generally not required over sewer mains with diameter DN300 or less, however a 1m wide easement must be provided to all maintenance structures in private property. Easements are required over sewer mains in certain circumstances.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8
2.2.1.2	• 6.0m wide where sewer >300 NB and ≤600 NB and depth ≤5m.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8
2.2.1.3	• 10.0m wide where sewer >300 NB greater than 5m deep OR sewer diameter greater than 600 NB.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8
2.2.1.4	• Easement requirements as per Queensland Urban Utilities Easement Guidelines and SEQ Code clause 5.2.8.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8
2.2.1.5	• Sewerage easements (where required) shall be centered over the pipe. Easements to maintenance structures shall follow the side boundary from the road reserve and encompass the maintenance structure.	Queensland Urban Utilities Easement Guidelines and SEQ Code cl 5.2.8

No.	CRITERIA	REFERENCE
2.3	**PIPE SIZE - Hydraulic Design**	SEQ Code Design Criteria
2.3.1	Sewers shall be sized to carry design flows without exceeding 75% of flow depth.	SEQ Code Design Criteria and clause 3 and5.5.3
2.3.2	Minimum pipe sizes shall be provided as per SEQ Code Table 5.5.	Table 5.5
2.4	**PIPE MATERIAL**	SEQ Code Infrastructure Products and Materials List (IPAM)
2.4.1	NuSewers	IPAM
2.4.1.1	o PE100 minimum PN8 SDR21. External colour light grey solid or striped. Internal colour white or light colour. Fully welded. Fittings PN10. *Higher class and size is required for trenchless installations. Higher class may be necessary in deep/shallow situations, RPEQ to provide certification of pipe structural design in deep/shallow/unusual situations.*	IPAM. SEQ Code cl 4. SEQ Code standard drawings for trenchless installations. AS2566 for certification of non-standard pipe class.
2.4.1.2	All PE – PE connections shall be welded. Flanged or Gripper connections are also permitted. PE flanges must be full-face with 316SS backing ring. PE stub flanges are not accepted.	4.7.1
2.4.1.3	*For Aerial Crossings/Reduced Clearances/Reduced Cover/Deep cover potential alternatives include:*	
2.4.1.4	• DI PN35 w calcium aluminate cement or alternatively DI with PE or Polyurethane lining	IPAM
2.4.1.5	• MS with fusion bonded coating internal/external.	IPAM
2.4.1.6	Structural bridging and flood report information shall be provided for aerial crossings. Aerial crossings not preferred. Risk of pipe damage and stormwater afflux. Evidence of no-objection from relevant authorities required for all aerial crossings.	
2.5	**LONGITUDINAL SECTION**	
2.5.0	Longitudinal sections shall be prepared as per the SEQ Code typical details.	SEQ-SEW-1101-1
2.5.2	Details of all property connections to be shown on the Longitudinal Section.	SEQ-SEW-1101-1

No.	CRITERIA	REFERENCE
2.5.3	Details of all other services to be shown on the longitudinal section with clearances per SEQ Code Table 5.4.	SEQ-SEW-1101-1 and Table 5.4
2.5.4	Provide details where a sewer crosses a water main > 300 NB.	5.4.5.1
2.5.5	Sewers of different diameters shall be graded obvert to obvert.	SEQ-SEW-1101-4
2.5.6	Minimum Grades:	SEQ Code Design Criteria
2.5.6.1	• DN100 (DN110 PE) - 1 in 60 (Property connections only)	
2.5.6.2	• DN150 (DN160 PE) - 1 in 100 (Property connections or sewer for first 10 allotments)	
2.5.6.3	• DN150 (DN160 PE) - 1 in 180 (Sewer after first 10 allotments)	
2.5.6.4	• DN225 (DN250 PE) - 1 in 300	
2.5.6.5	• DN300 (DN315 PE) - 1 in 400	
2.5.6.6	• DN375 (DN400 PE) - 1 in 550	
2.5.6.7	• For larger sizes refer SEQ Water and Sewer Planning Guidelines.	
2.5.7	Minimum cover (to crown of pipe):	Table 5.11
2.5.7.1	• Private residential property and public lots not subject to vehicular loading: existing development – 450mm.	
2.5.7.2	• Private residential property and public lots not subject to vehicular loading: new development – 600mm.	
2.5.7.3	• Private lots zoned residential subject to vehicular loading – 750mm.	
2.5.7.4	• Footways, nature strips, industrial and commercial lots, sealed road pavements other than major roads subject to vehicular loading - 1150mm	

No.	CRITERIA	REFERENCE
2.5.7.5	• Sewer in a footway containing a water main of 250mm internal diameter or more – 1650mm	
2.5.7.6	• Unsealed road carriageways, Major road carriageways, future road, rail and tram pavements – 1200mm (Unless greater cover required by road owner.	SEQ Code Standard Drawings and road owner requirements
2.5.8	Bulkhead/trenchstop spacing as per SEQ WSA02 Table 9.1. Grades of 1 in 20 or steeper require trenchstops/bulkheads.	Table 9.1
2.5.9	Minimum falls through MHs for deflection angle:	SEQ-SEW-1301-2, 1301-8, and cl 5.6.6
2.5.9.1	• 0 degrees - 20mm	
2.5.9.2	• Up to 45 degrees - 30mm	
2.5.9.3	• 45 – 90 degrees - 40mm	
2.5.9.4	• Branch <30 degrees - 30mm	
2.5.9.5	• Branch 30 – 60 degrees - 50mm	
2.5.9.6	• Branch 60 – 90 degrees - 80mm.	
2.5.10	NuSewer other drop type dimensions refer Std Drg SEQ-SEW-1301-2 and 1301-8.	
2.5.10.1	• Correct levels shown for connection to existing infrastructure.	
2.5.11	*Internal drops are not permitted* in a DN900 MH (Type 'G').	5.6.6.5
2.5.12	A maximum of 1x internal drop is permitted in a DN1200 *existing* MH. Connections to new manholes shall be provided via an external drop	5.6.6.5
2.5.13	Maximum depth of Type 'G' MH - 3 metres - ≤DN250 sewers.	SEQ-SEW-1301-3
2.5.14	Maximum depth of Type 'F' MH - 4.25 metres - ≤DN315 sewers.	SEQ-SEW-1301-9
2.5.15	Depth > 4.25 metres, Type 'X' MH.	
2.5.16	Vertical Curves:	5.6.7

No.	CRITERIA	REFERENCE
2.5.16.1	• The requirements and restrictions specified for horizontal bends in respect of, location, diameter, placement under road carriageways, minimum radius of curvature, methods of achieving, fabrication, and manufacture shall apply to vertical bends.	5.6.7
2.5.16.2	• Only long-radius bends shall be used.	5.6.7
2.5.16.3	• The maximum angle of deflection permitted for vertical bends is 30 degrees. The maximum number of vertical bends between adjacent maintenance structures is limited to two, and vertical bends shall not be used in combination with horizontal or compound bends between adjacent maintenance structures.	5.6.7
2.5.17	Embedment Type shall be shown on longitudinal section.	SEQ-SEW-1200-2, 1201-1 to 1205-1 and council standard drawings for trenches within roadways
2.6	**PROPERTY CONNECTIONS**	
2.6.1	Each residential property shall be provided with a property connection. The minimum size shall be DN110 PE for a single residential premise on a single lot or 2 residential premises on a single lot or 2 adjoining lots (subject to maximum length criteria). Minimum size DN160 PE for other property types.	Table 5.5; SEQ-SEW-1106 series; Water Approval Conditions
2.6.2	Property connections shall extend a minimum of 0.3m and a maximum of 0.75m into property (exceptions apply where buildings/structures conflict with this location.	SEQ-SEW-1106 series.
2.6.3	Ensure depth of property connection sufficient to fully control allotment:	5.6.5
2.6.3.1	• Controlling point 0.5m below FSL of most disadvantaged location in allotment	5.6.5
2.6.3.2	• Calculate longest possible length from most disadvantaged location to connection point	5.6.5
2.6.3.3	• Minimum grade 1 in 60 for DN110, 1 in 100 for DN160.	5.6.5
2.6.4	Property connections shall be located:	6.4, 6.5

No.	CRITERIA	REFERENCE
2.6.4.1	• 5.0m from side boundary unless driveway location known, in which case to be located clear	6.5.2
2.6.4.2	• On low side of property	6.5.2
2.6.4.3	• On opposite side of lot to driveway where fall across lot is small	6.5.2
2.6.4.4	• Not within 1m of existing or proposed structures.	MP1.4
2.6.5	Property connections shall be constructed on straight section of sewer main only.	5.3.8.1
2.6.6	A maximum of two property connections (DN110) are permitted into the vertical riser of a MS (entering at different levels separated by 500mm vertically).	7.7.4
2.6.7	NuSewer house connections as per SEQ Standard Drawings 1106-1 to 1106-7 ie. Types A1 to A4, B1 to B4, C1 to C4.	
2.6.8	NuSewer property connections into Type 'G' MHs shall be nominated as either 'A', 'C' or 'D' as per SEQ-SEW-1301-2.	SEQ-SEW-1301-2
2.6.9	NuSewer property connections into Type 'F' MH's shall be nominated as either 'A', 'C', 'D' or 'Internal Drop' (Existing DN1200 manholes only, and only if no other internal drops already exist) as per SEQ-SEW-1301-8.	SEQ-SEW-1301-8
2.6.10	Maximum depth of house connection 1.5m - otherwise vertical riser (jump-up) required.	6.3.5
2.6.11	Maximum depth of multi-residential, commercial or industrial connections is 3.0m.	6.3.5
2.6.12	Property connections deeper than 3.0m, shall be connected to a Maintenance Structure, not directly to sewerage main.	6.3.5
2.6.13	Property connections shall not be connected to branch and trunk sewers unless suitable inlets are provided at a MH and agreed by Queensland Urban Utilities. Where a water seal is provided it shall be as per SEQ-SEW-1307-2-4. Note: Water seals are generally not required.	6.2
2.6.14	Property connections for commercial and industrial developments shall not be directly connected to sewers, but shall be connected into a maintenance structure.	6.2
2.6.15	Provide network infrastructure to accommodate development of upstream properties as necessary.	Water Approval Conditions

No.	CRITERIA	REFERENCE
2.6.16	Maximum length of DN100 (DN110 PE) connection is 10m (25m may be accepted in brownfield developments at the discretion of Queensland Urban Utilities.).	6.7
2.6.17	Maximum length of DN150 (DN160 PE) connection is 30m.	6.7
2.6.18	Where a concrete slab is to be constructed over a property connection point, a 0.9m square removable section with suitable lifting lugs shall be provided centrally over the connection.	6.5.1
2.6.19	Property connections shall be provided to service all lots in accordance with cl 5.6.4. Partial lot service is subject to approval by Queensland Urban Utilities.	5.6.4
2.7	**BUILD OVER OR ADJACENT TO ASSETS (BOA) REQUIREMENTS**	MP1.4, SEQ Code clause 5.4.4
2.7.1	Assess any development works (building works, structures, retaining walls, etc.) that affect any Queensland Urban Utilities infrastructure. Obtain separate BOA approval and incorporate BOA requirements in design. Building work on a lot that contains, or is adjacent to a lot (or road reserve) that contains a sewer or water main shall be assessed against MP1.4.	MP1.4, 5.4.4
2.7.2	The location of existing structures, within the vicinity of proposed sewer infrastructure shall be detailed on the design drawings with footings and retaining structures detailed in sectional views as required. The design of new sewer infrastructure shall address the impact of the works on existing structures. The designer shall ensure that the proposed works will not adversely affect the structural integrity or performance of existing structures.	5.4.4
2.7.3	Sewers shall cross retaining walls as close as practicable to right angles. Where the sewer crosses under a boulder retaining wall, a concrete bridging slab shall be placed over the sewer. Where the sewer crosses under a retaining wall, an RPEQ certificate shall be provided to Queensland Urban Utilities verifying the structural integrity of the sewer.	5.4.4
2.7.4	Where the design includes underpinning, bridging or other works to protect a sewer, these shall be detailed on the sewer design and certified by an RPEQ as being adequate to both protect the sewer and any structure under which the sewer passes.	5.4.4

No.	CRITERIA	REFERENCE
2.8	**TRENCHLESS CONSTRUCTION**	5.2.6, 14.12
2.8.1	Trenchless construction methods may be used to facilitate the economic installation of sewers in difficult areas, or where required by road/rail owners. Where trenchless construction methods are required the particular design considerations for trenchless construction must be shown on the design as the design parameters and materials differ from open-trench construction methods.	
2.8.2	Requirements for trenchless construction that need to be considered include but not limited to:	5.2.6
2.8.2.1	• Accuracy required in line and level	
2.8.2.2	• Proximity to other services	
2.8.2.3	• Diameter of bore	
2.8.2.4	• Length of bore	
2.8.2.5	• Ground conditions	
2.8.2.6	• Minimum depth of cover	
2.8.2.7	• Access for equipment	
2.8.2.8	• Pipe lengths.	
2.8.3	Tolerances as per SEQ Code Table 5.1.	Table 5.1
2.8.4	Drawings to detail trenchless construction location, type, material and all necessary construction details.	
2.8.5	Bored and jacked trenchless installations shall comply with SEQ Code standard drawings SEQ-SEW-1401-1, 1402-1, 1403-1 and requirements of Queensland Government/QR as necessary.	SEQ-SEW-1401-1, 1402-1, 1403-1
2.8.6	Tracer Wire: Except for pipes enveloped in a steel enveloper pipe, all sewers, including property connection sewers, constructed by trenchless means shall incorporate tracer wire. Tracer wire shall be wound around or otherwise securely fixed to the pipes and terminated at both ends at an accessible point.	16.11.3

No.	CRITERIA	REFERENCE
3	**MAINTENANCE STRUCTURES**	**7**
3.1	**General**	
3.1.1	Maintenance structures (Maintenance Holes 'manholes' (MH), Maintenance Shafts (MS), Terminal Entry Points (TEP)) shall be installed at change of pipe material, direction, size, grade, at permanent or temporary ends of line, and at intervals subject to maximum spacing, and for all commercial/industrial property connections. (Queensland Urban Utilities does not accept Maintenance Chambers (MC), Rodding ends(RE)).	7.2/Table 7.1/7.3
3.1.2	Maintenance structures shall not be located within a building or under a building overhang.	MP1.4
3.1.3	Maintenance structures must generally not be located in drainage swales, table drains or detention basins where stormwater infiltration may occur or scouring may occur around the structure. MHs below Q100 levels are to have bolt down lids and top slab and scour protection to prevent erosion.	7.9.1, 7.2
3.1.4	Where a MH is required only cast in-situ concrete shall be used, with requirement for special class concrete to WSA PS-358 with calcareous aggregate.	7.6.2
3.1.5	Where modifications are proposed that change the loading or surface level of an existing MH which does not have a top slab, cover or frame that meets the current specifications for new work, then the modifications shown in SEQ Code Table 7.5A shall apply.	7.9.3, Table 7.5
3.1.6	Where existing MHs have damaged components the modifications in clause 7.9.3 Table 7.5A apply.	7.9.3, Table 7.5
3.1.7	Where any modification works are undertaken on a lamphole, the lamphole shall be replaced with an appropriate maintenance structure for the situation.	7.9.3
3.2	**Maintenance Holes (MH) ('Manholes')**	7
3.2.1	Maintenance Holes shall be located where required in clause 7.2, 7.3 and Table 7.1:	7.2, 7.3, Table 7.1
3.2.1.1	• MH are the only permitted maintenance structure on pipelines >DN225 (>DN250PE)	7.2

No.	CRITERIA	REFERENCE
3.2.1.2	• MH are required where MS are not appropriate e.g. sewer mains >DN250 PE; flowrates >22L/s; flowrates >12L/s and deflection angle >60degrees, >3 incoming sewers, a change of pipe materials where MS are accepted, etc.; *and*	7.7.2, 7.7.3
3.2.1.3	• At maximum spacing 240m from end of line; *and*	Figure 7.1
3.2.1.4	• At maximum spacing 480m.	Figure 7.2
3.2.2	Maximum distance between any 2 consecutive MH120m.	7.3.2
3.2.3	Maximum spacing of 480m between MH (when used with intermediate MS).	7.3.2
3.2.4	Maximum spacing between 'end of line' and nearest downstream MH is 240 metres where end of line is not a MH.	7.3.2
3.2.5	Concrete for MH construction shall be special class to WSA PS-358 with calcareous aggregate.	7.6.2
3.2.6	Protective PE lining required on MHs in the following instances:	7.6.2
3.2.6.1	• MHs ≥ DN1500	7.6.2
3.2.6.2	• MHs >4m deep	7.6.2
3.2.6.3	• MHs on sewers >300 NB	7.6.2
3.2.6.4	• MHs servicing an industrial area	7.6.2
3.2.6.5	• The collection manhole immediately upstream of a sewage pumping station	7.6.2
3.2.6.6	• The MH is a receiving MH for a sewer rising main or within 100m of such a receiving MH	7.6.2
3.2.6.7	• Where an assessment of corrosion or odour has indicated protection is required.	7.6.2
3.2.7	Ladders, step-irons and landings. Ladders or step irons required in MHs >0.85m deep. Ladders (not step irons) required in MHs >4.25m deep.	7.6.9
3.2.8	Maintenance hole sizes:	SEQ-SEW-Standard Drawings
	• 'G' Type ≤3m deep and ≤DN250 sewers	SEQ-SEW-Standard Drawings

No.	CRITERIA	REFERENCE
	• 'F' Type ≤4.25m deep and ≤DN315 sewers	SEQ-SEW-Standard Drawings
	• 'X' Type >4.25m deep	SEQ-SEW-Standard Drawings
3.3	**Maintenance Shafts (MS) and Terminal Entry Points (TEP)**	7.7
3.3.1	MS, TEP as per SEQ-SEW-1315-1.	SEQ-SEW-1315-1
3.3.2	The maximum allowable flow into a MS is 22L/s. If >22L/s use a MH.	7.7.2
3.3.3	Flow into a MS shall not to exceed 12L/s if the deflection through the MS is greater than 60 degrees. If the deflection angle is >60deg, use a 45deg stub inlet and LRB.	7.7.2
3.3.4	Maintenance shafts permitted only on sewers <= DN250 PE.	7.7.2
3.3.5	Maintenance shaft maximum depth 5.0m.	SEQ-SEW-1315-1
3.3.6	Incoming connections to a maintenance shaft riser must be a minimum of 100mm above the connection of the riser to the bowl, 750mm above MS IL, OR, enter at base with 20mm fall or graded obvert to obvert, unless outlet DN > inlet DN, in which case, grade obvert to obvert.	7.7.3.1
3.3.7	Stop-End 'End of Line' maximum of 30m from nearest downstream structure. Use electro-fusion or butt-welded end cap.	7.3.2, Figure 7.1
3.3.8	Where an 'End of Line' is greater than 30m from nearest downstream maintenance structure a new maintenance structure (MH, MS or TEP) shall be provided.	7.3.2, Figure 7.1
3.3.9	Additional Design Parameters for Maintenance Shafts:	
3.3.9.1	• A maximum of 1x DN150/160 sewer, or 2x DN100/110 property connections (at different levels separated by 500mm vertically), or 1 x DN150/160 property connection sewer are permitted to be connected in to the MS riser.	7.7.4
3.3.9.2	• The total loading from a connection into the riser of a MS shall not exceed 20EP.	7.7.4

No.	CRITERIA	REFERENCE
3.3.9.3	• The maximum grade of a connection to a MS is 1 in 10. Where the incoming or outgoing grade is steeper than 1 in 10, the sewer shall be provided with long radius curves to align to the set outlet and the set inlets.	7.7.3
3.4	**Modification to Existing Maintenance Structures:**	7.9.3
3.4.1	When undertaking works on existing maintenance structures, address requirements of clause 7.9.3.	7.9.3
3.5	**Access Covers**	7.9
3.5.1	Class B concrete infill covers shall be used in footway areas in residential developments and in locations with light duty non-frequent traffic clear of verge and road pavement e.g. residential driveway where traffic loading meets requirements of AS3996 Class B. For commercial/industrial areas where an access cover is located within a driveway, a Class D cast iron cover (*not* Class D concrete infill) and Class D top-slab is required. Maintenance structures should be designed to be located clear of commercial/industrial driveways where possible.	Table 7.5 AS3996
3.5.2	Bolt-down watertight access covers shall be specified on maintenance structures located:	7.9.1
3.5.21	• In areas where the risk of sewer overflow is high	7.9.1
3.5.22	• Along waterways subject to flooding where the cover level is below the 1% AEP	7.9.1
3.5.2.3	• In coastal zones. The top of the maintenance structure shall be at least 0.9m above maximum high tide AHD. (Highest Astronomical Tide (HAT) or storm, surge level, whichever is greater)	7.9.1, 5.2.7.5
3.5.2.4	• In any location where surface water could inundate the top of a maintenance structure e.g. overland drainage paths.	7.9.1
3.5.3	Maximum slope of covers:	
3.5.3.1	• 'B' Class 1 in 7	7.9.2

No.	CRITERIA	REFERENCE
3.5.32	• 'D' Class 1 in 10.	7.9.2
4	**LIVE WORKS (CONNECTIONS TO EXISTING INFRASTRUCTURE)**	
4.1	Any works which directly or indirectly impact the existing Queensland Urban Utilities network are to be carried out in accordance with a valid Queensland Urban Utilities Network Access Permit.	
4.2	A 'Live Sewer Works Table' (as shown on SEQ-SEW-1102-1) is required to be included in Design Package detailing all work relating to existing sewers. The administrative procedures, method, protocols, inspection and supervision requirements for a live sewer connection shall be agreed with Queensland Urban Utilities prior to the works being carried out.	SEQ-SEW-1102-1 cl 23
5	**OTHER**	
5.1	If Acid Sulfate Soils (ASS) are likely to be encountered an approved acid sulfate soil management report strategy shall be referenced on the drawings. Provide notes on drawings as required.	5.2.7.3
5.2	Design drawings shall detail treatment of disused sewers e.g. grout-filled, removed or disused.	5.2.9
5.3	Where reasonable doubts exist regarding the suitability of the ground to provide adequate support to the pipeline, and for pipelines > DN450, a geotechnical assessment shall be made of the proposed route.	9.6.1

No.	CRITERIA	REFERENCE
5.4	Add note on drawings regarding requirements for CCTV inspection, e.g.: All sewers and maintenance structures shall be inspected by CCTV. The first CCTV inspection shall be made prior to commissioning after all backfilling operations have been satisfactorily completed and all junctions have been installed. A second CCTV inspection is required prior to, but not more than two weeks before, the on-site inspection for "off maintenance" certification. CCTV equipment in accordance with section 21.8 of the SEQ Sewer Code and the WSAA *Conduit Inspection Reporting Code of Australia* WSA 05 and the results submitted to Queensland Urban Utilities for compliance checking.	21.8
5.5	Add note on drawings regarding requirements for detectable marker tape, e.g.: Detectable marker tape shall be provided either above the embedment zone or 1000mm below the F.S.L., whichever is closest to F.S.L.	16.11.2; SEQ-SEW-1200-2, 1201-1, 1202-1, 1203-1, 1204-1, 1205-1

9 Reference Document

9.1 Internal Queensland Urban Utilities reference documents and Australian Standards

Select Queensland Urban Utilities reference documents (and Australian Standards) are summarised below (*Queensland Urban Utilities reference documents not for external distribution unless agreed by Queensland Urban Utilities).* Obtain other external documents from relevant author.

Information Title	
SEQ Water Supply Code Version 1.2 2018	
Gravity Sewerage Code of Australia – South East Queensland Service Providers Edition Version 2.0 (July 2019)	
SEQ Code Asset Information Specification Version 2.0 October 2015	
SEQ Code Infrastructure Products and Materials (IPAM) list	
SEQ Code Design Criteria	
Queensland Development Code MP1.4 Building Over or Near Infrastructure	
QUU CHE422 – Check List – Gravity Sewer Design	
QUU CHE423 – Check List – Water Main Design	
QUU CHE424 – Check List – Structural Design	
QUU CHE425 – Check List – Project Technical Requirements	
QUU CHE506 – Check List – Drawings General	
QUU CHE507 – Check List – Drawings Gravity Sewer	
QUU CHE508 – Check List – Drawings – Reinforced Concrete	
QUU CHE509 – Check List – Drawings – Structural Steelwork	
QUU CHE510 – Check List Drawings – Water Mains	
PIPA POP202 – PVC and PE Pressure Pipe Installation on Curved Alignments	
QUU PRO395 – Queensland Urban Utilities Addendum to: SEQ Water Supply and Sewerage Design & Construction Code (SEQ WS&S D&C Code) – QUU Information Requirements	
QUU PRO662 – Safety in Design Procedure	
Australian Standards (commonly used for reference; not a complete list of all the relevant Australian standards)	
AS1170	Structural design actions
AS2280	Ductile iron pipes and fittings

AS2566.1	Buried flexible pipelines – structural design
AS2566.2	Buried flexible pipelines – installation
AS/NZS3000	Electrical installations (known as the Australia/New Zealand wiring rules
AS3600	Concrete structures
AS3735	Concrete structures retaining liquids
AS3996	Access covers and grates
AS4130	Polyethylene (PE) pipes for pressure applications
AS4799	Installation of underground utility services and pipelines within railway boundaries
AS4970	Guidelines to protection of trees on development sites

9.2 SEQ Code Additional Guidance

Additional guidance on Queensland Urban Utilities requirements for clauses (cl) in the SEQ Code that refer to '*Water Agency Requirements*' or '*SEQ-SP requirements*' that are not specifically described in the amendment to the SEQ Code, are included as Appendix A.

10 Procedure Guidance Notes – Minor Works

Refer post-approval guidance notes included in the Water Approval Decision Notice.

10.1 Design Variation – Minor Works

The designer shall obtain the written approval from Queensland Urban Utilities for any variations to the requirements of the SEQ Code. For applications assessed as Minor Works a Design Variation shall be submitted to Queensland Urban Utilities for review in accordance with the Queensland Urban Utilities Endorsed Consultant Deed. Queensland Urban Utilities will assess and either approve or refuse the design variation.

11 Procedure Guidance Notes – Major Works

Refer post-approval guidance notes included in the Water Approval Decision Notice.

12 As-Constructed Package Additional Information Requirements

Details and information shall be provided to Queensland Urban Utilities in addition to the SEQ Code Asset Information Specification Section 4 "*Detailed Requirements for Information Package"* and PRO395 Queensland Urban Utilities Addendum to SEQ Code Asset Information Specification as described below:

- As Constructed drawings must be as per the SEQ Code Asset Information Specification.
- As Constructed drawing set must be based on either approved design/for construction drawings updated with the as constructed survey data and as constructed comments (i.e. "Shall be removed" to "removed") in smart *PDF* and *DWG* formats.
- The drawings shall *only* contain the final details of construction. The marked up construction drawings shall show all changes, including notes and tables.
- The Queensland Urban Utilities endorsed consultant stamp (Minor Works only), as constructed, surveyor and stamps signed by RPEQ on each sheet/drawings.
- To show an item was not installed, remove the item from the drawing along with any associated devices, connecting lines, ducts, pipes and the like as well as any associated notes or dimensions. Line items and notes in tables shall be erased by drawing a line through them not by erasing the text.
- Drawings shall be marked with their purpose or status as appropriate using "As constructed".
- Sewerage as-constructed drawings as per SEQ Code and standard (SEQ-SEW-1100-1, SEQ-SEW-1101-1, SEQ-SEW-1101-3, and SEQ-SEW-1102-1).
- Water as-constructed drawings as per SEQ Code and standard drawings (SEQ-WAT-1100-2, SEQ-WAT-1101-2, and SEQ-WAT-1101-3).

- A compliant ADAC (Asset Design and As-Constructed) *XML* file is to be submitted along with Queensland Urban Utilities' required As-Constructed information as detailed in the Water Approval post-approval guidelines.

Queensland Urban Utilities do not require a *PDF* of the as-constructed survey when this information is included on the as-constructed drawing.

ADAC:

From 1 January 2016 Queensland Urban Utilities requires all as-constructed packages to comply with the SEQ Code's Asset Information Specification. Part of this involves the submission of an ADAC compliant XML file in the as-constructed package. Queensland Urban Utilities requires ADAC XML for:

- Water or Recycled Water development with more than 40 metres of pipe *or* more than 4 lots *or* internal diameter greater than 50mm
- Sewer development with more than 12 metres of pipe *or* more than 4 lots *or* internal diameter greater than 150mm

APPENDIX A

Additional guidance on SEQ Code clauses that refer to 'Water Agency' or 'SEQ-SP' Requirements

SEQ Water Supply Code Version 1.2 2018

Part	Clause	Heading	Clause Text	Documents that provide additional information on Water Agency Requirements
Part 0	-	-	-	-
Part 1	1.2.5.1	Detailed design - Designer's needs and responsibilities	*The design shall comply with the design parameters detailed in this Code and/or Water Agency requirements*	Queensland Urban Utilities Water Approval SEQ Code SEQ Standard Drawings
	2.4	System Configuration	*Network layouts shall conform to Water Agency Requirements*	Queensland Urban Utilities Water Approval SEQ Code SEQ Standard Drawings
	2.12 g)	System Review	*Disinfection residuals in the system meet Water Agency Requirements*	WSAA WSA 03-2011-3.1 Appendix I - Disinfection of Water Mains and Water Quality Compliance Specification
	2.12 i)	System Review	*Minimum and maximum flows and velocities meet Water Agency Requirements*	SEQ Design Criteria
	3.1.6.4	Flow Velocities	*Ensure adequate minimum velocities for maintaining water quality to Water Agency Requirements*	SEQ Design Criteria
	Table 4.1	Colour differentiation of drinking water and non-drinking water components in dual water reticulation systems	*Surface fittings and associated infrastructure to be colour coded in accordance with Water Agency Requirements*	SEQ Standard Drawings
	5.1.3	Water main renewals - electrical safety and earthing to water services	*Safety precautions shall be developed to address the safety of workers and property occupants during the work and the changed conditions following the work in accordance with regulatory and Water Agency requirements*	QLD Work Health and Safety Legislation, AS/NZS3500.1, Building Codes Queensland 'Electrical Safety for Plumbers', Workplace Health and Safety Electrical Safety Office
	5.11.1	Services, outlets and meters	*Above ground or below-ground meter installations shall be specified in accordance with Water Agency requirements*	SEQ Code SEQ Code Standard Drawings Appendix WC Supplementary Manual to WSA 03 Fire Hydrant & Hose Reel Metering Arrangements
	6.2.2.3 c)	Concept design - functionality	*Meet fire fighting requirements in accordance with Water Agency requirements*	Fire Flow Policy SEQ Code Design Criteria

Part	Clause	Heading	Clause Text	Documents that provide additional information on Water Agency Requirements
	6.2.2.16	Concept design - Signage	*Signage shall be provided for both booster identification and OH&S purposes in accordance with regulatory and Water Agency Requirements*	SEQ Code Standard Drawings
	6.2.5.1	Booster design - General	*Flow and pressure requirements shall be nominated by the water agency*	SEQ Design Criteria
	6.2.5.1	Booster design - General	*Detailed mechanical design shall be undertaken in accordance with Water Agency requirements*	Queensland Urban Utilities Specifications. Obtain from Queensland Urban Utilities on case-by-case basis
	6.2.8.1	Power system and supply - General	*Detailed electrical design shall be undertaken in accordance with AS/NZS 3000 and Water Agency requirements*	Queensland Urban Utilities Specifications. Obtain from Queensland Urban Utilities on case-by-case basis
	6.2.8.7	Power system and supply - Mobile Generator	*Connections to a mobile generator set shall be to Water Agency requirements*	Queensland Urban Utilities Specifications. Obtain from Queensland Urban Utilities on case-by-case basis
	6.2.10.1	Alarms and Controls - General	*Alarms shall be set to automatic or manual reset in accordance with Water Agency Requirements*	Queensland Urban Utilities Specifications. Obtain from Queensland Urban Utilities on case-by-case basis
	7.6.3.2	Encased steel pipelines - Existing steel pipelines	*… Design drawings and / or specifications shall include requirements that incorporates Water Agency requirements*	SEQ Code SEQ Standard Drawings
	l 8.10.2	Surface fittings - General	*The Designer shall prepare Design Drawing(s) showing the type and locations of all required surface fittings in accordance with Water Agency requirements*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM List
	8.10.4	Surface fittings - Installation requirements	*The Designer shall include the installation methods for all surface fitting types for all specified locations, which shall comply with the requirements of this clause and Water Agency requirements*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM List
	8.11.1	Appurtenance Location Marking - General	*Marker posts, plates and other markers and marking systems for the location of appurtenances such as hydrants, valves, …. shall be provided … in accordance with Water Agency requirements*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM List
	8.11.1	Appurtenance Location Marking - General	*The Designer shall prepare a Marking Schedule and Design Drawing(s)… which shall comply with the Water Agency requirements*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM List
	8.11.2	Marker posts and plates	*Marker posts and plates shall be provided for valves, hydrants and other appurtenances in accordance with Water Agency requirements*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM List
	8.11.4	Kerb markings	*The lettering shall be painted to Water Agency requirements*	SEQ Standard Drawings SEQ Civil IPAM List

Part	Clause	Heading	Clause Text	Documents that provide additional information on Water Agency Requirements
	9.1 d)	Design Review and Drawings - Design Review	*Maximum and minimum flow velocities meet Water Agency requirements*	SEQ Design Criteria
	9.1 h)	Design Review and Drawings - Design Review	*Mains layout and alignment meets Water Agency requirements*	SEQ Code SEQ Standard Drawings Road owner requirements for service allocation
	8.8.12	Metering of Fire Services	*All new fire services shall be metered in accordance with the SEQ-SP fire service metering policies and standards*	Appendix WC Supplementary Manual to WSA 03 Fire Hydrant & Hose Reel Metering Arrangements
	8.8.12	Metering of Fire Services	*Existing fire services, where significant alterations or renovations are proposed that require a Water Agencies' Approval under the SEQ-SPs Connections Policy shall also be metered in accordance with the SEQ-SP fire service metering policies and standards.*	Appendix WC Supplementary Manual to WSA 03 Fire Hydrant & Hose Reel Metering Arrangements
	8.8.12	Metering of Fire Services	*… Consult individual SEQ-SPs for details of typical metering arrangements set out in their fire service metering policies and standards.*	Appendix WC Supplementary Manual to WSA 03 Fire Hydrant & Hose Reel Metering Arrangements
	8.12	Flow Meter	*A flow meter shall not be directly buried. Instead, SEQ-SPs approved pits shall be used for flow meter installation.*	Appendix WC Supplementary Manual to WSA 03 Fire Hydrant and Hose Reel Metering Arrangements
	1.2.3 (viii)	Concept Plan Format	*Supply points and pressure or Hydraulic Grade Line (HGL) as supplied by SEQ-SPs*	Services Advice Notice
	2.2.4	Non-drinking water as drinking water substitution	*SEQ-SPs have requirements regarding areas for dual reticulation. Planners and designers are to refer to the SEQ-SPs for the details of these requirements*	Not currently applicable as Queensland Urban Utilities does not have dual systems
	2.9	Service Reservoirs - Storage Capacity	*Design and Construction Specifications with associated Standard Drawings shall be used for any reservoir procurement and SEQ-SPs shall be consulted for details.*	SEQ Design Criteria
	2.9	Service Reservoirs - Storage Capacity	*Emergency / fire storage capacity shall be determined by SEQ-SPs*	SEQ Design Criteria
	4.8.5	Cathodic Protection	*Any SCL or DICL pipe systems will be assessed for induced current and shall be referred to SEQ-SPs for a decision on the requirement for cathodic protection*	Services Advice Notice. Individual projects assessed on case-by-case basis
	5.4.13 (h)	Water Mains in conjunction with landscaping and/or other development	*Refer to the relevant SEQ-SPs building over or adjacent asset (BOAA) guidelines*	MP1.4

Part	Clause	Heading	Clause Text	Documents that provide additional information on Water Agency Requirements
	5.11.8	Property Service Meters	*If insufficient space is available at the front of the building, the meter may be placed within the building - refer to SEQ Property Service and Water Meter Code for requirements*	Developed Arrangements to be rolled out by Queensland Urban Utilities
	5.11.9	Water Services ≥ DN100	*All connections > 32mm ID to be provided in accordance with the requirements of the relevant SEQ-SP*	SEQ Code Developed Arrangements to be rolled out by Queensland Urban Utilities
	5.11.11	Private Boosters	*The design of private boosters shall comply with the appropriate guideline provided by the SEQ-SPs*	Refer to the relevant Council plumbing department. QUU Water Booster Pump Station Standard Technical Specification (TMS1638)
	5.11.12	Services to community title scheme	*Details of the sub metering shall comply with the relevant requirement SEQ-SPs technical specification*	Sub-metering Information Kit
Part 2	11.5.4 (b)	Private and public properties	*Comply with the Water Agency requirements for resolution of any dispute associated with access or entry rights to the Works*	Developers are responsible for negotiating and obtaining all necessary permissions associated with access or entry rights. Queensland Urban Utilities does not negotiate on behalf of developers.
	12.7	Supply of Water to Existing Properties	*Maintain supply of water to existing properties affected by the Works to Water Agency requirements,, which may require provision of temporary water supply piping*	Network Access Permit
	12.8.2	Valves	*Ensure the direction of spindle operation is in accordance with Water Agency requirements*	SEQ Civil IPAM list
	15.5.7	Under Pressure Cut-In Connection to Pressure Pipes ≥ DN80	*The removed coupon shall be logged and filed or given to the Superintendent depending on relevant Water Agency requirements.*	SEQ Code SEQ Standard Drawings SEQ Civil IPAM list WSAA WSA 03-2011-3.1 Appendix C - Under Pressure Cut-in Connection to Pressure Pipes > DN80
	15.8	Tapping of Mains, Property Services and Water Meters	*In some jurisdictions, the installation of property services and water mains may be required to be carried out by, or under the supervision of, a licensed plumber, in which case the work should comply with Plumbing Standards (AS/NZS 3500.1), as well as the requirements of this Code and the Water Agency requirements. Otherwise, install in accordance with the Design Drawings, Specification and any specific Water Agency requirements.*	SEQ Standard Drawings and Civil IPAM list

Part	Clause	Heading	Clause Text	Documents that provide additional information on Water Agency Requirements
	17.1.1.1	Material requirements	*Where the filled trench will be subjected to traffic loading, ensure the fill material complies with the road Owner's specifications or Water Agency nominated specifications.*	SEQ Standard Drawing and Civil IPAM list. If road owner requires higher specification than SEQ Code, road owner requirements govern
	17.1.1.1	Material requirements	*...Water Agencies should nominate product specifications that are approved for use.*	SEQ Standard Drawings and IPAM list
	18.3 (i)	Swabbing Procedure	*Dispose of swabbing wastewater in accordance with the relevant Regulator and Water Agency requirements*	No specific Queensland Urban Utilities requirements. Refer requirements of environmental regulator.
	19.4.4	Under Pressure Cut-In Connections	*Test the connection assembly on the host pipe prior to drilling in accordance with this clause and any other Water Agency requirements.*	SEQ Civil IPAM list WSAA WSA 03-2011-3.1 Appendix C - Under Pressure Cut-in Connection to Pressure Pipes ≥ DN80
	19.7.2 (c)	Test Procedure	*Dispose of testing water in accordance with the relevant environmental Regulator and/or Water Agency requirements.*	No specific Queensland Urban Utilities requirements. Refer requirements of environmental regulator.

APPENDIX B

Abbreviations and Acronyms

ABBREVIATIONS AND ACRONYMS	The following is taken from WSA 03—2011-3.1 (SEQ Code V1.2-2018)
%	percentage
°	degree
°C	degree Celsius
ABS	acrylonitrile butadiene styrene
AC	asbestos cement
ADAC	Asset Design As Constructed
AEP	annual exceedance probability
AHBP	allowable horizontal bearing pressure
AHD	Australian Height Datum
AICV	automatic inlet control valves
AIS	Asset Information Specification of the SEQ Code
AMG	Australian Map Grid
ARI	average recurrence interval
AS	Australian Standard
AS/NZS	Australian/New Zealand Standard
ASCE	American Society of Civil Engineers
ASS	Acid sulfate soils
ASTM	American Society for Testing Materials
ASTT	Australasian Society for Trenchless Technology
AV	air valve
AWA	Australian Water Association
AWWA	American Water Works Association
BS	British Standard
BSP	British Standard Pipe
c	dispersion factor
CBD	central business district
CC-GRP	centrifugally cast glass reinforced plastics
CCTV	closed-circuit colour television
CHAIR	Construction Hazard Assessment Implication Review
CICL	cast iron cement mortar lined
CIOD	cast iron outside diameter
CLSM	controlled low strength material
cm	centimetre
CP	cathodic protection
CSIRO	Commonwealth Scientific and Industrial Research Organisation
d	day
DC	direct current
DI	ductile iron
di	internal diameter
DICL	ductile iron cement (mortar) lined
DN	nominal size
DTMR	Queensland Government Department of Transport and Main Roads
DWF	dry weather flow

ABBREVIATIONS AND ACRONYMS	The following is taken from WSA 03—2011-3.1 (SEQ Code V1.2-2018)
DWV	drainage waste vent
EF	electrofusion
EIS	environmental impact statement
EN	European Standard
EP	equivalent population
ERS	emergency relief structure
ET	equivalent tenement
FF	full face
FSL	1 finished surface level 2 full storage level (of a reservoir)
FW-GRP	filament wound glass reinforced plastics
g	gravitational acceleration
g/m**2**	grams/square metre
GDA	Geocentric Datum Australia
GIS	geographical information system
GPS	Global Positioning System
GRP	glass reinforced polyester
GWI	ground water infiltration hour
h	hour
H	head (in metres)
H	head in metres of water
H2S	hydrogen sulphide
ha	hectare
HDD	horizontal directional drilling
HGL	hydraulic grade line
Hz	hertz
I/O	input/output
Ib	depth of bedding
IBC	inside bolt circle
Ic	width of side wall support
ICC	Ipswich City Council
ID	internal diameter
ID	Density Index
IEC	International Electrotechnical Commission
IIF	Inflow and infiltration
IL	invert level
ILAC	International Laboratory Accreditation Cooperation
IO	inspection opening
Io	depth of overlay
IPAM	Infrastructure Products and Materials
IS	inspection shaft
ISO	International Standards Organisation
ITP	inspection and test plan
kL	kilolitre
km	kilometre

ABBREVIATIONS AND ACRONYMS	The following is taken from WSA 03—2011-3.1 (SEQ Code V1.2-2018)
kN	kilonewton
kPa	kilopascal
ks	equivalent sand roughness size
Kv	kilovolt
L	litre
L/s	litres per second
lb	depth of bedding
lc	width of side wall support
lo	depth of overlay
LP	pipe length
L/s	litre/second
m	metre
m/s	metres per second
MAOP	maximum allowable operating pressure
max	maximum
MC	maintenance chamber
mg/L	milligrams/litre
MH	maintenance hole
min	minimum
Ml	millilitre
mL	millilitre
mm	millimetre
Mpa	megapascal
MPa	megapascal
MRA	Mutual Recognition Arrangement
MS	maintenance shaft
MS	Mild steel
MSCL	Mild steel cement lined
N	newton
N/A	not applicable
NATA	National Association of Testing Authorities
NDH	no discharge head
NFAEP	National fire ant eradication program
NOHSC	National Occupational Health and Safety Commission
nom	nominal
NPSHA	net positive suction head available
NSW	New South Wales
NTU	nephelometric turbidity unit
OD	outside diameter
OH&S	occupational health and safety
P&ID	process and instrumentation diagram
Pa	pascal
PCS	property connection sewer
PDF	peak day factor

ABBREVIATIONS AND ACRONYMS	The following is taken from WSA 03—2011-3.1 (SEQ Code V1.2-2018)
PDWF	peak dry weather flow
PE	polyethylene
PFD	process flow diagram
PHF	peak hour factor
PIPA	Plastics Industry Pipe Association of Australia Limited
PLC	programmable logic controller
PN	nominal pressure, in megapascals X 10
PN	pressure class (number)
PP	polypropylene
PPE	personal protection equipment
ppm	parts per million
PP-MD	polypropylene with mineral modifier
PRE	pitting resistance equivalent
PrelV	pressure relief valve
PRV	pressure reducing valve
PTFE	polytetrafluoroethylene
PVC	polyvinylchloride
PVC-M	polyvinylchloride modified
PVC-O	polyvinylchloride oriented
PVC-U	polyvinylchloride unplasticised
Q	flow (in cubic metres/second)
QR	Queensland Rail
RC	reinforced concrete
RD	density ratio
RD	dry density ratio
RDI	rainfall dependent inflow
REF	review of environmental factors
RL	reduced level
RRJ	rubber ring (seal) joint
RSL	reserve storage level
RTU	remote terminal unit
RV	reflux valve
s	second
S	spacing
SCADA	supervisory control and data acquisition
SCJ	solvent cement joint
SCL	steel cement (mortar) lined
SDR	standard dimension ratio
SEQ-SP	South East Queensland water service provider
SN	nominal stiffness, in N/m/m X 10-3
SN	stiffness class (number)
SPS	sewage pumping station
SR	spigot and recess
SS	stainless steel

ABBREVIATIONS AND ACRONYMS	The following is taken from WSA 03—2011-3.1 (SEQ Code V1.2-2018)
STP	system test pressure
SWJ	solvent weld joint
TEP	Terminal Entry Point
TG	tongue and groove
TMS	terminal maintenance shaft
UPCIC	under pressure cut-in connection
UV	ultraviolet
V	volt
VC	vitrified clay
VSD	variable speed drive
WAC	Work As Constructed
WHS	work health and safety
WPS	Water Pumping Station
WSAA	Water Services Association of Australia