



Engineering

Technical Standard

# TS 0511 – SA Water supplement to water supply code: WSA03

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**Government of  
South Australia**

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## Documents superseded by this standard

The following documents are superseded by TS 0511:

- a. SA Water – Water Supply Code of Australia Agency Requirements Part 0 – Glossary (2012)
- b. SA Water – Water Supply Code of Australia Agency Requirements Part 1 – Design (2014)
- c. SA Water – Water Supply Code of Australia Agency Requirements Part 2 – Construction (2012)
- d. TS 0522 – Allowable pipe size, class and material for Reticulation Water Mains

## Significant/major changes incorporated in this edition

This is the first version of this Technical Standard.


## Document controls

### Version history



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# Contents

<b>1</b>	<b>Introduction</b>	<b>6</b>
1.1	Purpose	6
1.2	Glossary	6
1.2.1	Terms and Definitions	6
1.2.2	Abbreviations	7
1.2.3	Terminology	8
1.3	References	9
1.3.1	Australian and international	9
1.3.2	SA Water documents	9
<b>2</b>	<b>Scope and application</b>	<b>11</b>
2.1	Scope and application of this Technical Standard	11
2.2	Works not in scope	11
2.3	Technical dispensation	12
2.4	Hazards	12
2.5	Hierarchy of documentation	12
<b>3</b>	<b>Supplementary requirements to WSA 03</b>	<b>13</b>
3.1	Part 1 - Planning and Design	13
3.2	Part 2 – Construction	33
<b>A</b>	<b>Demands</b>	<b>37</b>
<b>B</b>	<b>Service pressure</b>	<b>40</b>
<b>C</b>	<b>Minimum pipe sizes</b>	<b>42</b>
<b>D</b>	<b>Pipe Class and Materials</b>	<b>43</b>
<b>E</b>	<b>Notice of intent</b>	<b>45</b>

## List of tables

Table 1: Typical demand <sup>(1)</sup>	37
Table 2: Typical demand patterns (SA Water)	39
Table 3: Maximum and Desirable service pressure limits for drinking water supply	40
Table 4: Allowable reduction of minimum service pressure <sup>(1)</sup>	41
Table 5: Alignment of WSAA Water Supply Code 03 and the NCC Building Code	42
Table 6: Minimum pipe sizes for particular development types	42
Table 7: Minimum pipe sizes for particular rural systems	42

# 1 Introduction

SA Water is responsible for the construction and commissioning of an extensive amount of engineering infrastructure such that it is safe and functional.

This standard has been developed to assist in the design, maintenance, construction, and management of this infrastructure.

## 1.1 Purpose

The purpose of this standard is to detail minimum requirements to ensure that assets covered by the scope of this standard are constructed and maintained to consistent standards and attain the required asset life.

## 1.2 Glossary

Terms and Abbreviations utilised in this Standard are included in the following sections. The definitions presented below are to be used when interpreting this Standard and actions undertaken in relation to this Standard. Where a conflict exists, clarification is to be sought from SA Water.

### 1.2.1 Terms and Definitions

The following is a list of Terms applicable to this document:

Term	Description
<b>Accepted</b>	Determined to be satisfactory by SA Water's Representative.
<b>Allow</b>	Means that the cost of the item referred to is the responsibility of the Constructor
<b>Constructor</b>	The organisation responsible for constructing and installing infrastructure for SA Water whether it be a third party under contract to SA Water or an in-house entity.
<b>Contract</b>	A set of documents supplied to Constructor as the basis for construction; these documents contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.
<b>Customer Contract</b>	A specific property level agreement regarding service levels that may include special characteristics, flow rates and service pressures
<b>Designer</b>	The organisation responsible for designing infrastructure for SA Water whether it be a third party under contract to SA Water or a Constructor, or an in-house entity. A Designer is a person who effects design, produces designs or undertakes design activities as defined in the Work Health and Safety Act 2012 (SA).
<b>Informative</b>	Means "provided for information and guidance".
<b>Isolation Valve</b>	For the purposes of this standard, also refer Stop Valve
<b>Manufacturer</b>	A person, group, or company that owns and operates a manufacturing facility that provides materials for use in SA Water infrastructure.
<b>Must</b>	Indicates a requirement that is to be adopted in order to comply with the Standard.
<b>Person/s</b>	Each word implying a person, or persons shall, where appropriate, also be construed as including corporations.
<b>Provide</b>	Means "supply and install".

Term	Description
<b>Representative</b>	The Representative shall be either one of the following: <ul style="list-style-type: none"> <li>For Works delivered under a Developer Agreement Formal Instrument (DAFI), this shall be the Approved Superintendent.</li> <li>For works delivered directly for SA Water under a contract or other engagement, this shall be the SA Water Representative.</li> </ul>
<b>Responsible Discipline Lead</b>	The engineering discipline expert identified in the 'Approvers' table (via SA Water's Representative).
<b>SA Water Representative</b>	The SA Water representative with delegated authority under a Contract or engagement, including (as applicable): Superintendent's Representative (e.g. AS 4300 and AS 2124 etc.) SA Water Project Manager SA Water nominated contact person
<b>Should</b>	Indicates practices which are advised or recommended, but is not required
<b>Superintendent</b>	The Superintendent is an entity who is responsible to administering the construction contract and acts as a liaison between the construction contractor and the Principal.
<b>Supplier</b>	A person, group or company that provides goods for use in SA Water infrastructure.
<b>Technical Dispensation Request Form</b>	This form is part of SA Water's Technical Dispensation Request Procedure which details the process by which those required to comply, or ensure compliance, with SA Water's technical requirements may seek dispensation from those requirements.
<b>Transfer</b>	A transfer pipeline is a large diameter pipeline for conveyance of water, typically from a water treatment plant, reservoir or pumping station. Transfer mains are not available for customer connections and preferably do not interconnect with the reticulation network.
<b>Trunk</b>	A trunk main is also a large diameter pipeline, but may feed the reticulation network. These pipes generally range in diameter size >DN375mm to DN2100mm. Trunk mains are also not available for customer connection except by special arrangement.
<b>Work</b>	Elements of a project which require design and/or construction.

## 1.2.2 Abbreviations

The following is a list of Abbreviations, Acronyms and Initialisms used in this document:

Abbreviation	Description
<b>ADWG</b>	Australian Drinking Water Guidelines
<b>AS</b>	Australian Standard
<b>AS/NZS</b>	Australian Standard and Australian/New Zealand Standards
<b>BPS</b>	Booster Pump Station
<b>DICL</b>	Ductile Iron Cement Lined Pipes
<b>DN</b>	Nominal Diameter (mm) (ID PVC, OD PE)
<b>DS</b>	Design Standard
<b>EPA</b>	Environmental Protection Agency
<b>ESCOSA</b>	Essential Services Commission of South Australia
<b>FBE</b>	Fusion Bonded Epoxy
<b>HDD</b>	Horizontal Directional Drilling

Abbreviation	Description
<b>IoT</b>	Internet of Things
<b>NATA</b>	National Association of Testing Authorities
<b>O&amp;M</b>	Operations and Maintenance
<b>OTR</b>	Office of Technical Regulator
<b>PDA</b>	Peak Day Average
<b>PDF</b>	Peak Day Factor
<b>PE</b>	Polyethylene Pipe (PE 100)
<b>PHF</b>	Peak Hour Factor
<b>PLC</b>	Programmable Logic Controller
<b>PMP</b>	Project Management Plan
<b>PRV</b>	Pressure Reducing Valve
<b>PVC</b>	Polyvinyl chloride (Series 2)
<b>SA Water</b>	South Australian Water Corporation
<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>SCI</b>	Steel Cement Lined
<b>STD</b>	Standard Drawings
<b>TDRF</b>	Technical Dispensation Request Form.
<b>TG</b>	SA Water Technical Guideline
<b>TS</b>	SA Water Technical Standard
<b>UPS</b>	Uninterruptible Power Supply
<b>VSD</b>	Variable Speed Drive
<b>WDA</b>	Winter Day Average
<b>WSA/WSAA</b>	Water Services Association of Australia
<b>WSCM</b>	Water Supply Construction Manual (SA Water Standard Drawing Set)
<b>WTP</b>	Water Treatment Plant

### 1.2.3 Terminology

The following is a list of specific interpretations for Terminology used in this standard.

- Where an obligation is given and it is not stated who is to undertake these obligations, they are to be undertaken by the Constructor.
- Directions, instructions and the like, whether or not they include the expression “the Constructor shall” or equivalent, shall be directions to the Constructor, unless otherwise specifically stated.
- Where a submission, request, proposal is required and it is not stated who the recipient should be, it is to be provided to SA Water's Representative for review.
- Each word imparting the plural shall be construed as if the said word were preceded by the word "all".
- "Authorised", "approval", "approved", "selected", "directed" and similar words shall be construed as referring to the authorisation, approval, selection or direction of SA Water's Representative in writing.
- "Submit" mean “submit to the SA Water Representative or their nominated delegate”.

Unless noted otherwise, submissions, requests, proposals are to be provided at least 10 business days prior to work commencing or material ordering (unless noted otherwise).

## 1.3 References

### 1.3.1 Australian and international

The following table identifies Australian and International standards and other similar documents referenced in this document:

Reference	Title
	Environmental Protection Act 1993
	Water Industry Act and Regulations 2012
	Work Health and Safety Act 2012
<b>AS 2124</b>	General Conditions of Contract
<b>AS 4300</b>	General Conditions of Contract for Design and Construct
<b>AS/NZS 3500</b>	Australian Standard for Plumbing and Drainage
<b>NCC</b>	National Construction Code
<b>WSA 03</b>	Water Supply Code of Australia (current revision)

### 1.3.2 SA Water documents

The following table identifies the SA Water standards and other similar documents referenced in this document:

Reference	Title
<b>4005-30001 to 4005-30010</b>	Water supply construction manual (drawing set)
<b>Connections Policy</b>	SA Water connections Policy available on its website.
<b>DS 0300</b>	Electrical installations datasheets
<b>TS 0100</b>	Requirements for technical drawings
<b>TS 0101</b>	Safety in design standard
<b>TS 0103</b>	Survey requirements specification
<b>TS 0104</b>	Design quality management
<b>TS 0109</b>	Infrastructure design
<b>TS 0120</b>	Electronic security systems
<b>TS 0121</b>	Installation standards for physical security standards
<b>TS 0130</b>	As constructed data requirements for linear assets
<b>TS 0136</b>	Pipework access and protection
<b>TS 0220</b>	Requirements for pump specification, procurement and testing and the preparation of pump datasheets
<b>TS 0230.0</b>	General requirements for valves
<b>TS 0230.1</b>	Requirements for Gate Valves
<b>TS 0230.2</b>	Requirements for Butterfly Valves
<b>TS 0245</b>	Design requirements for ventilation and cooling systems

Reference	Title
TS 0300	The supply and installation of low voltage electrical equipment
TS 0340	Design, supply & installation of HV switchgear & associated equipment
TS 0350	SCADA systems
TS 0360	PLC and HMI systems
TS 0370	Fire detection and emergency evacuation systems
TS 0371	Arc flash hazard assessment and design aspects
TS 0440	Cathodic protection part 1 - pipelines
TS 0465	Mortar repair systems
TS 0503	Authorised products – water systems
TS 0522	Allowable pipe size, class and materials for reticulation water mains
TS 0523	Requirements for technical drawings in land development projects
TS 0601	Design, assessment and retrofitting of SA Water assets in bushfire -prone areas
TS 0603	Minimum requirements of geotechnical investigations
TS 0631	Fine materials for pipe embedment
TS 0633	Earthworks
TS 0720	Access infrastructure for water tanks
TS 0730	Stainless steel durability, fabrication and erection
TS 0900	Pressure testing of pipelines
TS 146c	Mechanical requirements for the commissioning and on-going monitoring of pumps and associated equipment
TS 147	Surge mitigating infrastructure
TS 15	Protection of Steelwork In Submersible Environments
TS 16	Protection of Steelwork In Atmospheric Environments
TS 18	Protection of Steelwork In Buried Environments

## 2 Scope and application

### 2.1 Scope and application of this Technical Standard

On 6 February 2020, the WSAA Codes became the mandatory minimum standard in South Australia for the water industry.

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#### WATER INDUSTRY ACT 2012

##### *Infrastructure Standard Published by the Technical Regulator*

This Standard is published by the Technical Regulator pursuant to section 66 of the *Water Industry Act 2012*. This Standard comes into effect on the date on which it is gazetted.

This Standard applies to infrastructure that is used, or is capable of being used in the water industry.

In accordance with section 66(4) the Technical Regulator adopts the Water Services Association of Australia (WSAA) codes as amended from time to time as the principle minimum Standard for water and sewerage infrastructure.

Dated: 30 January 2020

R. FAUNT  
Technical Regulator  
Department for Energy and Mining

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WSA 03 states:

*The Water Supply Code of Australia, together with a water agency supplement and other referenced documents, sets an agencies requirements for:*

- *Minimum acceptable technical criteria for design and construction of water supply and reticulation networks; and*
- *Supply of associated products and materials'*

This Technical Standard is applicable for water and non-drinking water infrastructure constructed as part of the reticulated network of nominal diameter  $\leq$ DN375 (unless noted otherwise).

This Technical Standard is to be read in conjunction with the current version of the WSCM – Water Supply Construction Manual Drawings.

This Technical Standard specifies deviations and additional SA Water requirements to the Water Supply Code of Australia (WSA 03 v3.2).

Section 3 provides the details of the SA Water requirements where there is a variation to WSA 03 and describes how this Technical Standard should be read in conjunction with WSA 03.

Where a WSA 03 section is not listed within this Technical Standard, SA Water requirements shall be assumed to be equal.

### 2.2 Works not in scope

This Technical Standard only applies to water and non-drinking water infrastructure of nominal diameter  $\leq$ DN375, unless noted otherwise. Booster pump stations, transmission mains, trunk mains, major valves and storages are outside of the scope of this document. Trunk mains  $\leq$ DN375 or bypass mains are excluded from this scope.

## 2.3 Technical dispensation

Departure from any requirement of this Technical Standard shall require the submission of Technical Dispensation Request Form (TDRF) for the review and approval (or otherwise) of SA Water Responsible Discipline Lead listed in Page 4, on a case-by-case basis.

The Designer shall not proceed to document/incorporate the non-conforming work before the Principal Engineer has approved of the proposed action in writing via the Technical Dispensation Request Form (TDRF).

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

Design works that are carried out without being appropriately sanctioned by SA Water shall be liable to rejection by SA Water and retrospective rectification by the Designer/Constructor.

## 2.4 Hazards

Hazards shall be identified and addressed in accordance with TS 0101.

## 2.5 Hierarchy of documentation

The following hierarchy of documentation will apply, consecutively, in the event of a contradiction, with this document being the highest priority:

- a. This document
- b. Other SA Water Technical Standards
- c. Water Supply Construction Manual Drawings
- d. WSAA codes (including figures)
- e. Australian Standards
- f. International Standards.

If there is any conflict of information, it shall be raised with SA Water.

### 3 Supplementary requirements to WSA 03

This section outlines supplementary requirements which elaborate on, or deviate from, those presented within WSA 03.

#### 3.1 Part 1 - Planning and Design

This section outlines supplementary requirements which elaborate on or deviate from those presented within WSA 03 Part 1 – Planning and Design.

WSA 03 clause	SA Water supplementary information
<b>1.2.6</b> <b>Design life</b>	<b>Supersede clause 1.2.6 with the following text:</b> <i>Refer to SA Water TS 0109 for Infrastructure design life.</i>
<b>2.2.4</b> <b>Non-drinking water as drinking water substitution</b>	<b>Delete 'and the impact .... pipe sizing' and add the following:</b> <i>if one is available.</i>
<b>2.3.1</b> <b>Demands – General</b>	For new land developments, SA Water will undertake demand and hydraulic modelling and provide pipe sizing and the concept reticulation layout based on a developer's allotment layout, land use applications together with current and future land use zoning.  <b>Add the following text before the last sentence in clause 2.3.1:</b> <i>For the design of the drinking water system, SA Water generally does not consider a decreased drinking water flow rate to account for the presence of a dual supply system on the basis that (i) the dual system may fail or be retired on commercial grounds, and (ii) fire flows are to be provided from the drinking water mains, meaning minimum main sizes criteria will still apply.</i>
<b>2.3.2.1</b> <b>Dual water supply system – General</b>	<b>Supersede paragraph 4 of clause 2.3.2.1 with the following text:</b> <i>The typical division of total demands into drinking and non-drinking components and recommendations on the design demand rates, compared to those for an exclusively drinking water supply, to be used in the design are shown in Appendix A of this document. These can be used in the absence of measured data from a reference system to estimate the typical flows of the drinking and non-drinking systems. SA Water requires the drinking water main to be sized for the full demand of a solely drinking water supply and satisfy minimum main size requirements. A guide for calculating peak hour demands for drinking water supply systems is included Appendix A of this document.</i>
<b>2.3.3.1</b> <b>Demand assessment – General</b>	<b>Supersede 'which caters for dual water supply systems' with the following:</b> <i>These demand flow rates are used to analyse the overall system performance.</i>

WSA 03 clause	SA Water supplementary information
<p><b>2.3.3.2</b> Demand assessment – Residential</p>	<p><b>Supersede Table 2.2 with the following:</b> <i>Refer to Appendix A of this document.</i></p>
<p><b>2.3.3.3</b> Demand assessment – Non-residential</p>	<p><b>Insert at start of sentence:</b> <i>'Consistent with the Customer Contract' where a property Owner requires...</i></p>
<p><b>2.3.4.2</b> Peak demands – Peak day demand</p>	<p><b>Delete 'Unless specified otherwise .... other available data', and add the following at the end of the clause:</b> <i>Peak Day Factor (PDF) for specific types of customers are shown in Appendix A of this document. An initial PDF of 2.7 should be used for a preliminary estimation of the peak day demand of entire supply areas (e.g., townships), unless other information is available for specific locations. If measurements are available, SCADA information, or approved IoT monitoring results, can be used to estimate more specific PDF.</i></p>
<p><b>2.3.4.3</b> Peak demands – Peak hour demand</p>	<p><b>Delete 'Unless specified otherwise .... PHF values shall be interpolated', and add the following:</b> <i>An initial PHF of 2.1 should be used for a preliminary estimation of the peak hour demand of entire supply areas (e.g., townships), unless other information is available for specific locations (e.g., contract agreement). If measurements are available, SCADA information, or approved IoT monitoring results, can be used to estimate more specific PHF.</i></p>
<p><b>2.3.5</b> Winter demand</p>	<p><b>Insert a new clause with the following content:</b> <i>Winter demand, typically used to assess the system water age, should be estimated based on available data or as specified by SA Water.</i> <i>When no measurement data is available, the winter demand can be estimated using a winter month factor of 0.5 based on the annual month average.</i></p>
<p><b>2.4</b> System configuration</p>	<p><b>Delete '(I) Water quality.' and add the following:</b> <i>(l) Water Quality: Other aspects not covered by point (e) above.</i> <i>(m) Water main break history and customer complaint records shall be considered.</i> <i>(o) maximum allowable number of new dwellings in a new land division supplied by a single main.</i></p>
<p><b>2.5.2</b> Network analysis</p>	<p><b>Insert at the end the following text: '.... demand condition for water quality.'</b> <i>Demand patterns applied may be synthetic or derived from the analysis of SCADA measurements or IoT data and should be agreed with SA Water. The persistence or duration of the demand simulation shall reflect the characteristics of the system under analysis.</i></p>

WSA 03 clause	SA Water supplementary information
<p><b>2.5.3.2</b> <b>Maximum allowable service pressure</b></p>	<p><b>Supersede 'Where the maximum ... individual property PRVs' with the following:</b> <i>On a new reticulation main extension where the maximum service pressure exceeds that in Appendix B of this document, the designer shall address the need for pressure-reducing facilities, e.g., a system PRV versus individual property PRVs. SA Water will advise of the maximum service pressure and requirement for PRV.</i></p> <p><b>Add the following text at the end of the existing clause:</b> <i>For normal operating conditions, there is already an AS/NZS 3500.1 requirement for a pressure limiting or reducing device downstream of the meter under certain conditions. These customer-owned devices are regulated by the OTR.</i></p>
<p><b>2.5.3.3</b> <b>Minimum service pressure</b></p>	<p><b>Supersede the second paragraph 'An additional desirable minimum head for .... shall be included' with the following:</b> <i>The system should be designed so that minimum service pressure for industrial/ commercial areas is 300kPa (30m head).</i></p> <p><b>Supersede 'Where Water Agency or licence ... shall apply' with the following:</b> <i>SA Water's desirable service pressure limits are listed in Table 3 of Appendix B of this document.</i></p>
<p><b>2.5.3.4.4</b> <b>Average service pressure – Dual water supply system</b></p>	<p><b>Delete the text 'It is desirable .... the Water Agency,' from clause 2.5.3.4.4.</b></p>
<p><b>2.5.3.5</b> <b>Average service pressure – Customer connections</b></p>	<p><b>Insert a new clause with the following text:</b> <i>When the connection of new customers may cause an unacceptable or a significantly lower level of service for existing customers, the connection of the new customers may be limited with a flow restrictor. This results in the customer having a standard contract with special characteristics as detailed in the SA Water Connections Policy.</i> <i>The default flow rate for a restricted 20mm connection is 5L/min.</i></p>
<p><b>2.5.4</b> <b>Pressure variation analysis</b></p>	<p><b>Add before 'Variations may be reduced by measures such as' the following:</b> <i>For planning purposes, SA Water will set expectations based on the type and configuration of the system.</i></p>
<p><b>2.7.1</b> <b>Permanent cross links and cross connections</b></p>	<p><b>Insert the following text at the end of this sentence 'Where the non-drinking .... prevention device':</b> <i>or by another method deemed to be compliant by SA Water.</i></p>

WSA 03 clause	SA Water supplementary information
<p><b>2.8.1</b> <b>Pumping stations – General</b></p>	<p>This section only applies to inline booster pump stations as part of a reticulation network servicing less than the equivalent of 50 residential allotments or as agreed with SA Water. Inline booster pump stations shall only be used to supplement existing gravity system and are not to be used to supply new developments that cannot be supplied via a gravity system except where specifically approved by SA Water.</p> <p><b>Add the following at the end of the existing clause:</b></p> <p><i>In general, inline booster pump stations supplying to demand shall be sized to meet SA Water's firefighting expectations in the area to be supplied. Pumps will need protection from low suction pressures if design flows are exceeded. Nominally allow for at least 10L/s for a fire plug in metropolitan areas. SA Water will advise requirements in regional / remote areas.</i></p> <p><i>Also refer to clause 6.2 In Line Pressure Booster Pumping Stations.</i></p>
<p><b>2.8.2.2</b> <b>Design factors – Site related factors</b></p>	<p><b>Add the following:</b></p> <p><i>(f) Availability of power supply.</i></p> <p><i>(g) Availability of land.</i></p> <p><i>(h) Environmental and heritage regulatory approval requirements.</i></p> <p><i>(i) Bushfire risks.</i></p>
<p><b>2.8.3</b> <b>Concept design</b></p>	<p><b>Add the following at the end of the existing clause:</b></p> <p><i>(e) Any nominated provision for emergency services or firefighting services.</i></p>
<p><b>2.9</b> <b>Service reservoirs</b></p>	<p><b>Add the following sentence:</b></p> <p><i>In SA Water terminology, 'Service Reservoir' generally refers to 'Service Tanks'.</i></p> <p>Service Tanks are outside the scope of this standard.</p>
<p><b>2.12</b> <b>System review</b></p>	<p><b>Replace from clause (e) in two locations 'allowable' with the following text:</b></p> <p><i>Desirable</i></p> <p><b>Add at the end of clause (e) the following:</b></p> <p><i>(Unless Special Characteristics apply).</i></p> <p><b>Add the following at the end of clause (n):</b></p> <p><i>Note that the SA Water operating licence does not specify firefighting flows or related levels of service. See clause 3.1.5 for further information.</i></p>

WSA 03 clause	SA Water supplementary information
<b>3.1.2</b> <b>Hydraulic design – Minimum pipe sizing</b>	<b>Supersede Table 3.1 with the following sentence:</b> <i>Refer to Table 4 (Appendix C of this document).</i>
<b>3.1.3</b> <b>Hydraulic design – Empirical sizing of reticulation mains</b>	Empirical sizing shall only be used for preliminary assessments and shall not be used for design purposes.
<b>3.1.4</b> <b>Hydraulic design – Dual water supply systems</b>	<b>Supersede the text ‘Sizing of water mains .... with 3.1.5 Fire flows.’ with the following:</b> <i>Only drinking water shall be used for fire fighting.</i>
<b>3.1.5</b> <b>Hydraulic design – Fire flows</b>	<b>Supersede the text ‘Where a dual water .... water supply sources’ with the following:</b> <i>Currently, the use of dual water systems for firefighting is not permitted.</i> <i>In some systems, it may be necessary to increase the size of the drinking water main(s) to provide basic firefighting capability.</i> <i>Under planning regulation, customers are required to take necessary steps to ensure they are compliant with relevant Planning Regulations regarding firefighting.</i>
<b>3.1.6.2</b> <b>Hydraulic design – Head losses</b>	<b>Replace (a) and (b), respectively, with the following:</b> <i>5m head/km for <math>\leq</math>DN150</i> <i>3m head/km for <math>\geq</math>DN200</i>
<b>3.1.6.3</b> <b>Hydraulic design – Hydraulic roughness value</b>	<b>Add at the end of the existing clause:</b> <i>SA Water may also request the use of different approaches to compute the friction losses in mains (e.g., the use of the Hazen Williams equation) and specify typical values based on the materials and age of the main, and on the type of water transferred (e.g., drinking water or raw water). SA Water currently accept both the Hazen Williams equation and Colebrook White equation.</i>

WSA 03 clause	SA Water supplementary information
<p><b>3.1.6.4</b> <b>Hydraulic design – Flow velocities</b></p>	<p><b>Add the following after the sentence ‘velocity is typically in the range 0.8 m/s to 1.4 m/s.’</b> Minimum velocities less than 0.25 m/s are to be avoided where possible to reduce the risk of issues such as sedimentation build up.</p> <p><b>Insert the following between ‘within the system (water age) from the last’ and ‘disinfection facility’:</b> <i>chlorination</i></p> <p><b>Insert at the end of sentence ‘The total travel.....residuals at an effective level)’.</b> the following: <i>For the systems sourced from surface water (River Murray and Reservoirs), typical maximum water ages are 3-5 days for chlorine systems, and up to 30 days for chloraminated systems.</i></p> <p><b>Insert at the end of the clause:</b> <i>In the examples above, water age is used as a proxy for free and total residual. For target residuals, refer to the Australian Drinking Water Guidelines for typical values, and consult with SA Water for further information regarding specific target residuals.</i> <i>While these are general guidelines, specific guidelines should be set by considering the source water quality treatment process and network conditions.</i></p>
<p><b>3.2.2</b> <b>Gravity systems</b></p>	<p><b>Delete ‘Systemic surge is usually not a characteristic of gravity systems’, replace with ‘On larger gravity systems due diligence to be undertaken to determine if gravity system has a systemic surge characteristic’</b></p>
<p><b>3.5</b> <b>System test pressure</b></p>	<p><b>Add the following at the beginning of the clause:</b> <i>Unless otherwise specified by SA Water, the system...</i></p>
<p><b>3.6.2</b> <b>Design for dynamic stress – Surge</b></p>	<p><b>Supersede clause 3.6.2 with the following text:</b> <i>Refer to TS 147 for surge mitigation infrastructure requirements.</i></p>
<p><b>4</b> <b>Products and materials</b></p>	<p><b>Supersede the entirety of clause 4 other than clauses 4.3.3 and 4.3.7, with the following text:</b> <i>Refer to Appendix D for approved pipe class and materials</i> <i>Refer to TS 0503 for authorised products and materials.</i> <i>Refer to TS 0440 for cathodic protection requirements.</i> <i>Refer to TS 15, TS 16, and TS 18 for Coatings (Supplement to WSA 201)</i> <i>Refer to TS 0730 for Stainless steel</i> <i>Refer TS 0420 for welding</i></p> <p><i>Loose polyethylene sleeving is preferred for all ductile iron pipes within the reticulation network.</i></p>

WSA 03 clause	SA Water supplementary information
<b>5.2.4</b> <b>Reduced size mains</b>	<b>Supersede clause 5.2.4 with the following text:</b> <i>Refer to WSCM drawing 4005-30005-14 for SA Water's requirements for reduced-size mains in cul-de-sacs.</i>
<b>5.4.2.2</b> <b>Location in footway</b>  <b>5.4.2.3</b> <b>Location in carriageway</b>	<b>Supersede clauses 5.4.2.2 and 5.4.2.3 with the following text:</b> <i>Refer to WSCM drawing set 4005-30004 for the general location of water mains in road reserves.</i>
<b>5.4.4</b> <b>Water mains in easement</b>	<b>Supersede clause 5.4.4 with the following:</b> <i>SA Water watermains within private property should be avoided where possible. Where approved, the watermains shall be located within an easement.</i> <i>All Water Supply easements shall be vested in the name of the South Australian Water Corporation.</i> <i>Access and easement sizes are to be sufficient to allow maintenance vehicle access (with easement size to be approved by SA Water) with consideration of area of potential damage and reinstatement should a pressure main burst or leak.</i> <i>SA Water easements where approved may only be shared with Council (Local Government) stormwater pipes and shall comply with the requirements of TS 0136.</i> <i>Other authorities and utilities (especially power, gas and telecommunication) are not permitted to share or co-locate within SA Water easements to facilitate their respective services. This is due to the risk of damage as a result of a burst or leak and WHS implications for SA Water's maintenance and operational personnel, or for workers contracted by SA Water.</i>  <b>5.4.4.1 Locations of Mains/Easements</b> <i>Where it is not practical to run the water mains in the roadway, (e.g., due to topographical or linking requirements), water mains may be located in easements taken specifically for that purpose.</i>  <b>5.4.4.2 Dual water supply system with Easements</b> <i>Where dual water (drinking and non-drinking) mains must share the same easement, there shall be a minimum separation of 1.5 m between the mains.</i>  <b>5.4.4.3 Easement Widths and Clearances</b> <i>Refer TS 0136 for easement widths and clearances.</i> <i>The easement width and clearance will be assessed by SA Water representative based on a risk assessment considering operational needs and potential damage.</i>

WSA 03 clause	SA Water supplementary information
	<p><i>5.4.4.4 Easement Obtained under Developer Contracts</i></p> <p><i>The developer shall be responsible for all costs associated with the acquisition of water main easements that are required within the development.</i></p> <p><i>Easement within the development shall be established based on the Final Development plan. The developer's licensed surveyor shall prepare and lodge the final plan with the Development Assessment Commission.</i></p> <p><i>Where easements external to the development are required, the developer may acquire them independently or may request that SA Water compulsorily acquire them at the Developer's cost.</i></p>
<p><b>5.4.5</b> <b>Dual Water supply systems</b></p>	<p><b>Supersede clause 5.4.5. with the following text:</b></p> <p><i>Drinking and non-drinking water mains each have their own allocated alignment and are not to be installed in shared trenches. Refer to WSCM drawing 4005-30004-02 for the typical drinking and non-drinking water mains layout.</i></p>
<p><b>5.4.9.1</b> <b>Crossing – General</b></p>	<p><b>Insert the following text at the beginning of clause 5.4.9.1:</b></p> <p><i>Also refer to TS 0136 and WSCM drawings 4005-30005-15, 4005-30005-16 and 4005-30005-17.</i></p>
<p><b>5.4.12</b> <b>Overhead power lines and transmission towers</b></p>	<p><b>Insert the following text at the end of clause 5.4.12:</b></p> <p><i>Also, refer to TS 0136 for further overhead services requirements.</i></p>
<p><b>5.4.13</b> <b>Water mains in conjunction with landscaping and/or other development</b></p>	<p><b>Supersede clause 5.4.13 with the following text:</b></p> <p><i>Refer to the Water Industry Act and Regulations 2012 and TS 0136 for requirements of clearances to trees.</i></p>
<p><b>5.4.15</b> <b>Location markers</b></p>	<p><b>Supersede clause 5.4.15 with the following text:</b></p> <p><i>Refer to the WSCM 4005-30007-04 drawing for location marker requirements.</i></p>
<p><b>5.4.16.2</b> <b>Marking tape –Mains</b></p>	<p><b>Supersede clause 5.4.16.2 with the following text:</b></p> <p><i>Refer to WSCM drawing 4005-30003-02 for embedment zone reinstatement requirements.</i></p> <p><i>Refer to WSCM drawing 4005-30005-17 for locating cable requirements for pipes installed through trenchless methods.</i></p> <p><i>Refer to WSCM drawing 4005-30003-08 for marking tape requirements for restrained ductile iron joint pipes.</i></p>
<p><b>5.4.16.3</b> <b>Property services</b></p>	<p><b>Supersede clause 5.4.16.3 with the following text:</b></p> <p><i>Marking tape is required only if required in accordance with WSCM drawing 4005-30006-01.</i></p>

WSA 03 clause	SA Water supplementary information
<p><b>5.5</b> <b>Trenchless Technology</b></p>	<p><b>Insert the following at the beginning of the clause:</b></p> <p><i>Horizontal directional drilling (HDD) should only be undertaken where it can be demonstrated to the satisfaction of SA Water that there are significant benefits compared with conventional open-cut installation.</i></p> <p><i>For HDD applications, the HDPE pipe class shall be designated as one pipe class above that otherwise required (and shall be a minimum of PN16) to account for scratching or scoring of the pipe during installation.</i></p> <p><i>Also refer to WSCM drawings 4005-30005-15, 4005-30005-16 and 4005-30005-17 for HDD requirements.</i></p>
<p><b>5.6</b> <b>Shared trenching</b></p>	<p><b>Add at the beginning of clause 5.6 the following text:</b></p> <p><i>Shared trenching is not preferred. Any shared trenching shall comply with the minimum clearances defined in TS 0136.</i></p>
<p><b>5.10.1</b> <b>Termination points – Permanent ends of water mains</b></p>	<p><b>Supersede clause 5.10.1 with the following:</b></p> <p><i>Refer to SA Water WSCM drawings 4005-30005-10 and 4005-30005-11 for permanent ends of water mains requirements.</i></p>
<p><b>5.10.3</b> <b>Chlorination assemblies</b></p>	<p><b>Supersede clause 5.10.3 with the following:</b></p> <p><i>Refer to SA Water WSCM drawing 4005-30002-04 for chlorination assembly requirements.</i></p>
<p><b>5.12</b> <b>Obstruction and Clearance</b></p>	<p><b>Supersede the entirety of clause 5.12 with the following text:</b></p> <p><i>Refer to TS 0136 for clearance requirements.</i></p> <p><b>Insert at the end:</b></p> <p><i>Clearance from SA Water customer service connection pipes to common service trenches shall be in accordance with the WSCM drawing series 4005-30004.</i></p>
<p><b>5.14</b> <b>Minimum pipeline grade</b></p>	<p><b>Insert the following additional clause 5.14:</b></p> <p><i>The minimum grade of trunk mains shall be in accordance with the following:</i></p> <ul style="list-style-type: none"> <li><i>a) 0.2% rising in the primary direction of flow.</i></li> <li><i>b) 0.4% falling in the primary direction of flow.</i></li> </ul>
<p><b>6.2</b> <b>In-line pressure booster pumping stations</b></p>	<p>This section only applies to inline booster pump stations servicing less than the equivalent of 50 residential allotments. Refer amended WSA clause 2.8.1</p> <p><b>Insert at the beginning of the clause 6.2 the following text:</b></p> <p><i>Also refer to TS 0220 for Requirements for Pump Specification</i></p>
<p><b>6.2.2.1</b> <b>Concept Designs – General</b></p>	<p><b>Insert at the end of clause 6.2.2.1:</b></p> <p><i>A design report shall be submitted by the Designer and/or Constructor to capture the technical inputs, assumptions and reference Codes and documents used in the design.</i></p>

WSA 03 clause	SA Water supplementary information
<b>6.2.2.3</b> <b>Functionality</b>	<b>Supersede clause (a) of clause 6.2.2.3 with the following:</b> <i>Flow-rate is dependent on the design basis. Boost pressure to a maximum of 40 L/s in the ultimate boosted zone, inclusive of any fire flows.</i> <i>For higher flow rates, bespoke design, of the pump station, will be required;</i>
<b>6.2.2.6 (e)</b> <b>Maintainability</b>	<b>Supersede clause 6.2.2.6 (e) with:</b> <i>Utilise TS 0503 for valves and associated equipment.</i>
<b>6.2.2.7</b> <b>Materials design</b>	<b>Add at the end of clause 6.2.2.7:</b> <i>Refer to SA Water's Technical Standards TS 15, TS 16, and TS 18 and TS 0730.</i>
<b>6.2.2.10</b> <b>Noise control</b>	<b>Insert after the first paragraph "...by Regulations." the following text:</b> <i>Refer to the Environment Protection (Noise) Policy 2007 (South Australia).</i>  <b>Add at the end of clause 6.2.2.10:</b> <i>The Designer shall undertake noise studies to:</i> <ol style="list-style-type: none"> <li><i>a) determine background noise levels prior to construction</i></li> <li><i>b) identify sensitive receivers, including consideration of future development;</i></li> <li><i>c) estimate expected noise levels from the pumping station; and</i></li> <li><i>d) ensure that the pumping station location and design includes appropriate measures to mitigate any potential noise issues.</i></li> <li><i>e) Mitigation measures may include:</i> <ol style="list-style-type: none"> <li><i>i. Use of silenced plant and equipment</i></li> <li><i>ii. House all plant and equipment in a sound attenuated structure or enclosure</i></li> <li><i>iii. Physically separate the noise sources and the sensitive receivers (both existing and planned) as far as practicable</i></li> <li><i>iv. Position all openings (e.g. ventilation intake/exhaust) away from sensitive receivers;</i></li> <li><i>v. Use acoustic louvers on ventilation openings; and</i></li> <li><i>vi. Schedule constructions works such that usage occurrences and usage times of noisy equipment are minimised.</i></li> </ol> </li> </ol>

WSA 03 clause	SA Water supplementary information
<p><b>6.2.2.12</b> <b>Access</b></p>	<p><b>Remove the last paragraph "Specific consideration shall be...vehicles shall also be provided."</b></p> <p><b>Insert at the end of clause 6.2.2.12:</b></p> <p><i>Spatial allowances are dependent upon site specific considerations (e.g., orientation, access, maintenance needs, accumulator vessel needs, permanent emergency generator location etc.), which must be noted and addressed in safety in design workshops to ensure sufficient space is provided for safe access to, and maintenance of, all infrastructure associated with the pump station site.</i></p> <p><i>Where agreed with operators, the minimum Design Vehicle to be adopted in design is as follows:</i></p> <ul style="list-style-type: none"> <li>a) <i>Truck Length 11m.</i></li> <li>b) <i>Truck Stabiliser width 5.6m (where required).</i></li> <li>c) <i>Min working width 7.4m.*</i></li> </ul> <p><i>*Minimum working width includes 900mm allowances for workers either side of vehicle/crane with stabilisers engaged. Note there is a preference for internal cranes to be installed within water pumping stations.</i></p> <p><i>The Designer is responsible for the allocation of adequate space for a temporary mobile or permanent generator, structure to house pumping units and associated equipment, accumulator vessel where required.</i></p> <p><i>Adequate space shall be provided for the Design Vehicle to park, without obstructing public footpaths, roadways, or bike lanes.</i></p> <p><i>Drive through access is the preferred method of site entrance and exit. If drive through access is not possible, sufficient space shall be available for a 3-point turn of the Design Vehicle, without requiring the manoeuvre to be conducted on roadways, public footpaths, or bike lanes. This is to allow the Design Vehicle to leave the site driving in a forward direction. Such movements/turning circles of the Design Vehicle are to be shown on the design drawings.</i></p> <p><i>Parking to allow manual opening of gates etc. shall not obstruct roadways or bike lanes and shall only result in brief obstructions of footpaths.</i></p> <p><i>Allowance for a "slip lane" or similar is to be provided where the BPS is located on an existing or future arterial road.</i></p>
<p><b>6.2.2.15</b> <b>Security</b></p>	<p><b>Insert at the end of clause 6.2.2.15:</b></p> <p><i>Physical security shall be in accordance with TS 0121. Electronic security shall be as per TS 0120.</i></p> <p><i>In addition, a meeting/briefing shall be held (at 60 % design at the latest) with representatives from SA Water's Security team to allow them to prepare a security risk assessment for the site and, subsequently, a statement of requirements for internal and external security for the facility.</i></p>
<p><b>6.2.2.17</b> <b>Supporting systems</b></p>	<p><b>Add to clause (c) of clause 6.2.2.17 the following:</b></p> <p><i>Refer to TS 0601 for design of infrastructure in bushfire-prone areas.</i></p>
<p><b>6.2.2.18</b> <b>Health and safety</b></p>	<p><b>Insert at the end of clause 6.2.2.18:</b></p> <p><i>Safety in Design risk assessment shall be applied to all BPS facility designs and shall follow the process outlined in SA Water TS 0101.</i></p>

WSA 03 clause	SA Water supplementary information
<b>6.2.2.19</b> <b>Ventilation system</b>	<b>Insert new clause:</b> <i>A cooling and/or ventilation system of the structure where the pumps and electrical equipment are housed shall be designed in accordance with the requirements of TS 0245.</i>
<b>6.2.3.1</b> <b>(Commissioning Plan)</b> <b>General</b>	<b>Insert new paragraph after first sentence in clause 6.2.3.1:</b> <i>Commissioning plans are to be written which incorporate the requirements of SA Water TS 146C for testing of water pump stations.</i>
<b>6.2.4.1</b> <b>Modelling</b>	<b>Insert at the end the following text:</b> <i>Refer to SA Water for project-specific requirements and guidance.</i>
<b>6.2.5.2</b> <b>Connection to the Network</b>	<b>Delete the following text from the second sentence of clause 6.2.5.2: “Non-return valves shall be provided at zone boundary connection points...” and amend with the following:</b> <i>“A non-return valve and associated pipework (the same size as the supply pipe to the BPS suction side) shall be included at the BPS, as a by-pass,…”</i>
<b>6.2.5.3</b> <b>Maximum Flow and Pressure Requirements</b>	<b>Insert the following text at the end of clause 6.2.5.3:</b> <i>Surge modelling shall be completed in accordance with TS 147.</i>
<b>6.2.5.5</b> <b>Design for minimum flow conditions</b>	<b>Insert at the end of clause 6.2.5.5:</b> <i>To achieve low flow conditions, the solution shall consider the maximum number of pump start requirements in TS 0220.</i>
<b>6.2.5.6</b> <b>Booster configuration design</b>	<b>Insert at the end of clause 6.2.5.6:</b> <i>Note that SA Water's preference is for a design generally along the lines of those presented in WSA 03 Appendix D, D1, D4, and D8.</i>
<b>6.2.5.7</b> <b>Booster set and pump selection</b>	<b>Replace the second paragraph in clause 6.2.5.7 with:</b> <i>The Designer shall use vertical multistage pump/ motor units booster configuration design as approved by SA Water.</i>  <b>Replace clause (b) of clause 6.2.5.7 with:</b> <i>Maximum number of pump starts per hour not to exceed 90% of the manufacturer's equipment capability or the requirements in TS 0220, whichever is the lesser.</i>  <b>Insert at the end of clause 6.2.5.7:</b> <i>Pump selection shall be in accordance with TS 0220, TS 146C and TS 0300. Pump datasheets shall be prepared using standard template for water pumps in accordance with TS 0220.</i>

WSA 03 clause	SA Water supplementary information
<b>6.2.5.8</b> <b>Booster pipework and manifold design</b>	<p><b>Replace the second paragraph in clause 6.2.5.8 with:</b></p> <p><i>All booster pipework shall be manufactured in stainless steel in accordance with TS 0420 and TS 0730. Design of pipework shall be in accordance with AS 4041.</i></p> <p><i>Pipework, fittings, and valves shall be configured on the pump skid to be mounted with sufficient upstream and downstream straight pipe lengths to satisfy individual equipment manufacturer's recommendations.</i></p> <p><i>Clearance between adjacent pumps and/or mounted equipment to be a minimum of 600mm to allow access for maintenance and generally in accordance with TS 0720.</i></p>
<b>6.2.5.10</b> <b>Site specific requirements</b>	<p><b>Add to the end of clause 6.2.5.10 (m):</b></p> <p><i>(m) consider access clearances around equipment for operations and maintenance staff. Refer TS0720.</i></p> <p><b>Add clause 6.2.5.10 (n):</b></p> <p><i>(n) lifting equipment fitted to provide aid in lifting individual pumps and valves/equipment heavier than 16kg. Refer NOHSC 2005 (1990) National Code of Practice for manual handling.</i></p>
<b>6.2.6.2</b> <b>Manifolds, off-takes, suction and delivery pipework</b>	<p><b>Insert at the end of clause 6.2.6.2:</b></p> <p><i>Connections to the reticulation network shall include fire plugs and normally open stop valves on the suction and discharge pipework of the BPS.</i></p> <p><i>A locked stop valve between these suction and discharge connections on the reticulation network pipework shall be included.</i></p>
<b>6.2.8.1</b> <b>Power system and supply – General</b>	<p><b>Amend the first sentence of clause 6.2.8.1 to:</b></p> <p><i>Detail electrical design shall be undertaken in accordance with AS/NZS 3000 and the following SA Water Technical Standards:</i></p> <ul style="list-style-type: none"> <li><i>a) TS 0300: The Supply and Installation of Low Voltage Electrical Equipment.</i></li> <li><i>b) TS 0340: The Design, Supply &amp; Installation of HV Switchgear &amp; Associated Equipment.</i></li> <li><i>c) TS 0370: Fire Detection and Emergency Evacuation Systems.</i></li> <li><i>d) TS 0371: Arc Flash Hazard Assessment and Design Aspects.</i></li> </ul> <p><b>Add at the end:</b></p> <p><i>The use of SA Water's Automation Panel (refer TS 0104) is mandatory for all aspects of the detailed design, procurement, supply, installation, testing, training, and documentation of any works associated with the electrical, control systems (including all associated instrumentation), telemetry and radio systems, and SCADA modifications (screens, historian, alarm response instructions and so forth).</i></p>

WSA 03 clause	SA Water supplementary information
<p><b>6.2.8.6</b> <b>On-site generator</b></p>	<p><b>Insert at the end of clause 6.2.8.6:</b>  <i>On- site generators shall be diesel engine driven and comply with the requirements of TS 0300. A diesel generator datasheet shall be prepared using DS 0300.</i>  <i>The diesel fuel tank storage capacity for continuous operation at full rated load shall be confirmed with SA Water prior to procurement.</i></p>
<p><b>6.2.8.9</b> <b>Lighting</b></p>	<p><b>Add into clause 6.2.8.9:</b>  <i>Internal and external lighting design and system components shall be in accordance with TS 0300.</i></p>
<p><b>6.2.9.1</b> <b>Control and telemetry system – General</b></p>	<p><b>Amend the first sentence of clause 6.2.9.1 to:</b>  <i>Design and installation of all control and telemetry shall comply with the following SA Water Technical Standards:</i></p> <ul style="list-style-type: none"> <li><i>a) TS 0350: SCADA Systems.</i></li> <li><i>b) TS 0360: PLC and HMI Systems.</i></li> </ul> <p><b>Add at the end:</b>  <i>The use of SA Water's Automation Panel (refer TS 0104) is mandatory for all aspects of the detailed design, procurement, supply, installation, testing, training, and documentation of any works associated with the electrical, control systems (including all associated instrumentation), telemetry and radio systems, and SCADA modifications (screens, historian, alarm response instructions and so forth).</i></p>
<p><b>6.2.9.3</b> <b>System requirements</b></p>	<p><b>Add the following text to the end of the fifth paragraph in clause 6.2.9.3:</b>  <i>VSDs mounted directly to the motor/pump, along with proprietary pump skid controllers, are not acceptable to SA Water. The PLC shall control the pumps directly i.e. not a packaged pump controller.</i></p>
<p><b>6.2.11.1</b> <b>General</b></p>	<p><b>Delete the last sentence in clause 6.2.11.1 and replace with:</b>  <i>Standby power supplies for telemetry and communications equipment shall be in accordance with the requirements set out in SA Water's TS 0300 for UPS systems.</i></p>
<p><b>6.3.1 Pressure reducing valve installations</b> <b>Planning criteria</b></p>	<p><b>Insert at the end of clause 6.3.1:</b>  <i>Also, refer to SA Water for project-specific requirements and guidance.</i></p> <p><b>Add the at the end of (c) the following:</b>  <i>Notwithstanding this, it is acknowledged that some SA Water systems have variations that exceed 70m. At this stage, this is considered acceptable for existing systems.</i></p>

WSA 03 clause	SA Water supplementary information
<b>6.5.1</b> <b>Standpipe</b>	<p><b>Insert a new clause with the following text:</b></p> <p><i>Where a standpipe is installed, a flow restriction shall be installed. The default maximum flow allowed for standpipes with free discharge is 6 L/s, to maintain an acceptable level of service to the existing customers. Standpipe isolation valves shall be geared to manage closure times to nominally to not less than 10 seconds</i></p>
<b>7.4.2</b> <b>Structural design – Pipe cover</b>	<p><b>Supersede clause 7.4.2 with the following text:</b></p> <p><i>Refer to WSCM drawing 4005-30002-01 for minimum cover requirements, noting that achieving the required cover to suit the height of inline valves, and the requirements and constraints found in AS2566.1 and TS 0136, shall also be considered.</i></p> <p><i>Also, refer to WSCM drawings 4005-30005-08 and 4005-30005-09 for details of “dog-legs” to be used when the pipe cover is greater than 1200mm due to service obstructions.</i></p>
<b>7.4.3</b> <b>Embedment zone dimensions</b>	<p><b>Supersede clause 7.4.3 with the following text:</b></p> <p><i>Refer to WSCM drawings 4005-30002-01 and 4005-30003-01 for trench width and embedment zone dimension requirements.</i></p>
<b>7.4.4</b> <b>Pipe embedment</b>	<p><b>Supersede clause 7.4.4 with the following text:</b></p> <p><i>Refer to WSCM drawings 4005-30003-01 and 4005-30003-02 for pipe embedment requirements.</i></p>
<b>7.5.1</b> <b>General</b>	<p><b>Supersede ‘Unless otherwise specified.... near adjacent structures’ of clause 7.5.1 with the following text:</b></p> <p><i>Refer to SA Water TS 0603 for requirements of geotechnical investigations and reports.</i></p> <p><i>Refer TS 0136 for clearances to adjacent structures.</i></p>
<b>7.5.5</b> <b>Geotechnical conditions – Groundwater management</b>	<p><b>Insert a new clause 7.5.5 with the following text:</b></p> <p><i>The Constructor shall be responsible for:</i></p> <ol style="list-style-type: none"> <li><i>a) Obtaining any further geotechnical or groundwater information (including any specialist advice that may be necessary) for the design and operation of any groundwater or dewatering systems.</i></li> <li><i>b) Assessing the geotechnical and groundwater information provided by the Designer on the Design Drawings or other documents and implementing the appropriate actions to facilitate construction.</i></li> <li><i>c) The design, installation and operation of all groundwater control and dewatering systems to:</i> <ol style="list-style-type: none"> <li><i>(i) Prevent heave of, or loss of density in the material comprising the floor of any excavation or pipe trench.</i></li> <li><i>(ii) Maintain the stability of the walls in all excavations and trenches.</i></li> <li><i>(iii) Maintain “dry” working conditions in all excavations and trenches.</i></li> <li><i>(iv) Preventing flotation of any pipeline or structure during construction and at all other times.</i></li> </ol> </li> </ol> <p><i>Confirming, during excavation, whether the geotechnical conditions found on the site are in accordance with those indicated on the Design Drawings or in accordance with any subsequent investigations undertaken by the Constructor.</i></p> <p><i>Where the actual foundation conditions are found to be as indicated on the Design Drawings or by any subsequent investigations undertaken by the Constructor, then the Constructor may proceed with the Works.</i></p>

WSA 03 clause	SA Water supplementary information
	<p>Where the foundation conditions are found to be not as indicated on the Design Drawings or by any subsequent investigations undertaken by the Constructor, the Constructor shall not proceed with the Works, and shall immediately inform the Representative of the findings.</p> <p>Construction work shall only proceed after the appropriate foundation treatment has been specified by the Designer and approved in writing by the Representative.</p> <p>If groundwater is encountered, the water table shall be lowered to below the level of the floor of the excavation or trench (e.g. by well pointing) before further excavation is carried out if:-</p> <ul style="list-style-type: none"> <li>a) There is the possibility that there may be heave or loss of density in the material comprising the floor of the excavation or trench.</li> <li>b) There may be a threat to the stability of the walls of the excavation or trench.</li> <li>c) It may otherwise not be possible to maintain “dry” working conditions in the excavation or trench.</li> </ul> <p>Observation wells shall be installed to verify and monitor the lowering of the water table.</p> <p>The water table shall be maintained below the level of the floor of the excavation or trench until the excavation or trench has been backfilled, or until such time as there is no danger of flotation of the newly installed structure or pipes.</p> <p>The reduction in dewatering shall be gradual and progressive until the water table has substantially reached its original level.</p> <p>The Constructor shall remove any water that may enter or be found in excavations or trenches while the pipes are being laid and while any other works under the Contract are being constructed. The Constructor shall have sufficient pumping units available at all times, ready for immediate use.</p> <p>Where only small quantities of groundwater are encountered, provided that there is no possibility that there may be heave of, or loss of density in, the material comprising the floor of the excavation or trench, or a threat to the stability of the walls of the excavation or trench, the Representative may allow the Constructor to stabilise the trench bottom by means of 20mm aggregate or the installation of underdrains to convey water away from the immediate work place to temporary pump sumps formed in the floor of the excavation. No aggregate will be permitted within 150mm of the outer surface of the pipes.</p> <p>Water from groundwater control systems, excavations or trenches shall be disposed of in such a manner that it shall not cause injury to persons or property, to the work completed or in progress, to the surface of the streets, or cause any interference with the use of the streets by the public or be a public nuisance. Dewatering water shall be discharged in accordance with SA Water and EPA approvals.</p>
<p><b>7.6.1</b> <b>Concrete encasement – General</b></p>	<p><b>Supersede the text ‘Where trenchless construction .... embedment material where:’ of clause 7.6.1 with the following:</b></p> <p>Concrete encasement shall only be used if specifically approved by SA Water, as encasement increases the complexity and time taken to repair the pipeline.</p>
<p><b>7.9.2.1</b> <b>Pipeline anchorage – Thrust blocks – General</b></p>	<p><b>Insert at the beginning of clause 7.9.2.1:</b></p> <p>Refer to WSCM drawings 4005-30003-06, 4005-30003-07 and 4005-30003-09 for details of thrust blocks for pipes of nominal diameter ≤DN375.</p>

WSA 03 clause	SA Water supplementary information
<b>7.9.2.2</b> <b>Concrete thrust blocks</b>	<b>Insert at the beginning of clause 7.9.2.2:</b> <i>Refer to WSCM drawings 4005-30003-06, 4005-30003-07 and 4005-30003-09 for details of thrust blocks ≤DN375.</i>
<b>7.9.2.4</b> <b>Timber and recycled plastics thrust blocks</b>	<b>Insert at the beginning of clause 7.9.2.4:</b> <i>Timber and recycled plastic thrust blocks shall only be used for temporary thrust restraint during construction.</i>
<b>7.9.5</b> <b>Restrained elastomeric seal joint water mains</b>	<b>Supersede clause 7.9.5 with the following:</b> <i>Refer to WSCM drawing 4005-30003-08 for SA Water's requirements for restrained ductile iron systems.</i>
<b>7.10</b> <b>Bulkheads and trench stops</b>	<b>Supersede clause 7.10 with the following:</b> <i>Refer to TG96 for guidance on when to use trench stops and bulkheads. SA Water approval is required for use of bulkheads and trenchstops, and must be marked clearly on the as-constructed drawings if used. Trench stops may also be used to manage the movement of hydrocarbons subject to project-specific approval by SA Water (via TDRF).</i>
<b>8.2</b> <b>Appurtenances – Stop valves</b>	<b>Add at the beginning of clause 8.2 the following:</b> <i>Isolation valves specified in TS 0503 may only be used within the reticulation system.  Only valves specified in TS 0230 series may be used without specific approval from SA Water.  Gate valves with integral by-pass shall not be installed.</i>
<b>8.2.2.2</b> <b>Gate valves</b>	<b>Insert at the beginning of clause 8.2.2.2</b> <i>Refer to TS 0230.1 for gate valves, and TS 0230.2 for butterfly valve requirements.</i> <b>Supersede “anti-clockwise” with the following:</b> <i>clockwise</i> <b>Supersede ‘where specified by the Water Agency, a valve chamber .... Figure 8.6’ with the following:</b> <i>Where a pipeline criticality is assessed by SA Water as being high, a gate valve may be requested, by SA Water, to be installed within a valve pit, subject to the space required being available.  Note that, with respect to Figures 8.4 and 8.5, SA Water's preference is generally for the entire bypass pipework and valve arrangement to be within the chamber, rather than going through the chamber wall.</i> <b>Insert at the end of clause 8.2.2.2 the following:</b> <i>The requirement for valve gearing shall be confirmed by the Designer, considering the valve size and actuation methods available.</i>

WSA 03 clause	SA Water supplementary information
<b>8.2.2.3</b> <b>Butterfly valves</b>	<b>Supersede clause 8.2.2.3 with the following:</b> <i>Butterfly valves are not to be used in the reticulation system. If proposed for the trunk or major transfer system, their use shall be risk assessed and agreed upon with SA Water, including O&amp;M staff.</i> <b>Add at the end of clause 8.2.2.3 the following:</b> <i>Also, refer to TS 0230.1 for gate valves, and TS 0230.2 for butterfly valve requirements.</i>
<b>8.2.3</b> <b>Stop valves for transfer / distribution mains</b>	<b>Add at the end of clause 8.2.3 the following:</b> <i>Also, refer to the maximum drain downtimes in WSA Table 8.3 when determining stop valve spacing.</i>
<b>8.2.4</b> <b>Stop valves for reticulation mains</b>	<b>Insert at the end of clause 8.2.4:</b> a) <i>The maximum shut-off block shall be defined as 50 properties for any water main size.</i> b) <i>The maximum number of valve operations shall be 10 operations.</i>
<b>8.2.6</b> <b>Bypass of stop valve</b>	<b>Add the following at the end of clause 8.2.6:</b> <i>Isolation valves with integral bypass shall not be used.</i>
<b>8.2.7</b> <b>Stop valves – location and arrangements</b>	<b>Add, at the start of the clause, the following text:</b> <i>Stop valves shall be located and arranged as per WSCM drawings 4005-30005-03 to ...-07, 4005-30005-13, 4005-30005-15, and 4005-30005-18. These arrangements are to be used in preference to arrangements shown under this clause.</i>
<b>8.2.9</b> <b>Rider mains and network configurations</b>	<b>Insert at the beginning of clause 8.2.9 the following text:</b> <i>Direct tappings are not permitted on water mains of diameter <math>\geq</math>DN375 without consent from SA Water.</i>
<b>8.4</b> <b>Air valves</b>	<b>Insert additional paragraph immediately below heading 8.4 AIR VALVES:</b> <i>Automatic air valves are generally not permitted to be installed on SA Water mains. Limited exceptions may apply, where approved by SA Water, for transfer mains where double acting air valves may be shown to be required for water hammer mitigation. Refer to SA Water's TS 147.</i>
<b>8.5.3</b> <b>Non-return valves for local in-line booster</b>	<b>Add the following text at the end of clause 8.5.3:</b> <i>Also refer to SA Water's TS 147 for consideration of check valve slam.</i>
<b>8.6.2</b> <b>Scours and pump out branches – Design</b>	<b>Insert the following at the end of clause 8.6.2:</b> <i>The design shall also consider the outcome of the Safety in Design review when determining the number and location of scour valves.</i>

WSA 03 clause	SA Water supplementary information
<p><b>8.6.3</b> <b>Scour application</b></p>	<p><b>Supersede the text 'For mains <math>\geq</math>DN375...downstream valve closed.' with the following, in clause 8.6.3:</b> <i>For new installations, two valves in series shall be installed on scour lines as either two gate valves, or a single gate and then a non-return flap valve.</i></p>
<p><b>8.8.3</b> <b>Hydrant siting principles</b></p>	<p><b>Supersede item (b) with the following text:</b> <i>Hydrants adjacent isolation valves and branches shall be located in accordance with WSCM drawings 4005-30005-03 and 4005-30005-18.</i></p> <p><b>Supersede item (c) with the following text:</b> <i>Provide hydrants on both sides of isolation valves.</i></p> <p><b>Add to the end of item (d)</b> <i>Refer clause 8.8.8</i></p>
<p><b>8.8.4</b> <b>Hydrant types</b></p>	<p><b>Supersede clause 8.8.4. with the following text:</b> <i>Refer to SA Water TS 0503 for authorised hydrant products.</i></p>
<p><b>8.8.7</b> <b>Hydrant size</b></p>	<p><b>Supersede clause 8.8.7 with the following text:</b> <i>Hydrants shall be DN80. Refer to TS 0503 for Authorised products water systems.</i></p>
<p><b>8.8.8</b> <b>Hydrant spacing</b></p>	<p><b>Supersede clause 8.8.8. with the following:</b> <i>The maximum spacing between consecutive hydrants along a linear section of main, in a reticulation network, shall be 80m in CBD/commercial/industrial areas, 150m in residential areas and in regional townships, and 400m for country lands outside of townships.</i></p>
<p><b>8.8.9</b> <b>Hydrant Location</b></p>	<p><b>Supersede Clause 8.8.9 with the following text:</b> <i>For locations of hydrants on reticulation networks, refer to the WSCM 4005-30005 and 4005-30007 series.</i></p>
<p><b>8.10.3</b> <b>Marking of surface fittings</b></p> <p><b>8.10.4</b> <b>Installation requirements</b></p>	<p><b>Supersede clauses 8.10.3 and 8.10.4 with the following text:</b> <i>Refer to WSCM drawing 4005-30007- series.</i></p>

WSA 03 clause	SA Water supplementary information
<p><b>8.11.1</b>  <b>Appurtenances location marking – General</b></p> <p><b>8.11.2</b>  <b>Marker posts and plates</b></p>	<p><b>Supersede clause 8.11.1 and 8.11.2 with the following text:</b>  <i>Refer to WSCM drawings 4005-30007-03 and 4005-30007-04.</i></p>
<p><b>9.2</b>  <b>Design review and drawings – Design drawings</b></p>	<p><b>Supersede clause 9.2 with the following text:</b>  <i>Refer to SA Water TS 0100 and TS 0523 (Pending).</i></p>
<p><b>9.4</b>  <b>Recording of work as constructed information</b></p>	<p><b>Supersede clause 9.4 with the following text:</b>  <i>Refer to TS 0130 for As Constructed data requirements for linear assets.</i></p>

## 3.2 Part 2 – Construction

This Section outlines supplementary requirements which elaborate on or deviate from those presented within WSA 03 Part 2 – Construction

WSA 03 clause	SA Water supplementary information
<b>12.</b> <b>Products and materials</b>	<b>Supersede clause 12 with the following text:</b> <i>Refer to TS 0503, and TS 0440 for authorised materials and products.</i>
<b>14.1</b> <b>Bedding for pipes – Trench floor preparation</b>	<b>Supersede 'the density of the natural ground' with the following text:</b> <i>50kPa.</i>
<b>14.2</b> <b>Bedding and pipe support</b>	<b>Supersede clause 14.2 with the following:</b> <i>Use SA Water Technical Standard TS 0631 sand and refer to WSCM 4005-30003 drawing series pipe bedding and trench preparation.</i>
<b>15.1</b> <b>Pipe laying, jointing and connection – Installation of pipes</b>	<b>Insert at the beginning of clause 15.1 the following text:</b> <i>Refer to WSCM 4005-30003-02 for pipe installation and TS 0503 for authorised products for water systems.</i>
<b>15.2.3</b> <b>Curving of pipe</b>	<b>Supersede clause 15.2.3 with the following sentence:</b> <i>SA Water does not allow cold bending (deflection) of PVC pressure pipe.</i>
<b>15.7</b> <b>Thrust and anchor blocks and restrained joints</b>	<b>Insert at the beginning of clause 15.7 the following text:</b> <i>Refer to WSCM drawings 4005-30003-06 to 4005-30003-09 for thrust block requirements (for pipe size ≤ DN 375).</i>
<b>15.11</b> <b>Corrosion protection of ductile iron</b>	<b>Add the following text at the end of clause 15.11:</b> <i>Also, refer to WSCM drawing 4005-30005-01 for DICL pipe sleeving requirements and SA Water TS 15, TS 16, and TS 18.</i>
<b>15.12</b> <b>Marking tapes</b>	<b>Supersede clause 15.12 with the following:</b> <i>Refer to WSCM drawing(s) 4005-30003-01 and 4005-30003-02 for embedment zone requirements. Refer to WSCM drawing 4005-30006-01 for marker tape requirements for property services. Refer to WSCM drawing 4005-30005-17 for locating cable requirements for pipes installed through HDD.</i>
<b>15.18 Appurtenance location marker</b>	<b>Insert the following text at the beginning of clause 15.18:</b> <i>Refer to WSCM drawings 4005-30007-03 and 4005-30007-04 for location marker requirements.</i>

WSA 03 clause	SA Water supplementary information
<b>15.20.3 Reinstatement of cement mortar lining</b>	<b>Add at the end of clause 15.20.3 the following sentence:</b> <i>Where the cement mortar cannot be reinstated, a closing collar shall be installed, with additional wall thickness to account for corrosion allowance. Also refer to TS 0465 and WSCM drawing STD-06-00013_01.</i>
<b>15.20.4 Reinstatement of external corrosion protection at joints using a tape system</b>  and  <b>15.20.5 Reinstatement of external corrosion protection at joints using a heat-shrinkable sleeve system</b>	<b>Supersede clauses 15.20.4 and 15.20.5 with the following text:</b> <i>Refer to TS 15, TS 16, and TS 18 for buried pipe protection requirements.</i>
<b>16 Pipe Embedment and Support</b>	<b>Supersede clause 16.1 with the following text:</b> <i>Refer to TS 0631 for pipe embedment fine materials and the WSCM drawing 4005-30003-02 for pipe embedment requirements.</i>
<b>17.1 Fill – Trench fill</b>	<b>Supersede clause 17.1 with the following text:</b> <i>Refer to WSCM 4005-30003-01 and 4005-30003-03 drawings for trench backfill requirements.</i>
<b>18 Swabbing</b>	<b>Supersede clause 18 with the following text:</b> <i>SA Water does not require swabbing of water mains unless specifically requested.</i>
<b>19.3 Acceptance testing – Compaction testing – General</b>	<b>Supersede clause 19.3 with the following:</b> <i>Refer to TS 0633 Earthworks for requirements.</i> <i>The contractor shall be responsible for all compaction testing in accordance with TS 0633.</i>
<b>19.4 Hydrostatic pressure testing</b>	<b>Supersede clauses 19.4 with the following sentence:</b> <i>Refer to TS 0900 for pipe pressure testing requirements.</i>

WSA 03 clause	SA Water supplementary information
<p><b>19.6</b> <b>Insulated joint resistance test</b></p>	<p><b>Supersede clause 19.6 with the following text:</b> <i>Refer to STD-04-00001-13 and STD-04-00001-14 drawings for further insulated joint testing requirements.</i></p>
<p><b>20</b> <b>Disinfection</b></p>	<p><b>Supersede clause 20 with the following text:</b> <i>When either the complete, or stage of, water reticulation system is ready to be newly linked up to active mains it shall be disinfected by SA Water prior to that section of the system being put into service.</i> <i>The Constructor shall give the SA Water Representative 'notice of intent' for the disinfection to be carried out. Minimum notification time requirements are detailed in Appendix E of this document.</i> <i>Also, refer to SA Water WSCM drawing 4005-30005-19. A document 'New Assets - Water Quality and Monitoring Requirements for Commissioning' is available from SA Water</i></p>
<p><b>21.2.2</b> <b>Horizontal tolerances property services and meters</b></p>	<p><b>Supersede clause 21.2.2 with the following text:</b> <i>The Consultant shall specify the required position of property connections on the design drawings. SA Water tolerances are specified in the WSCM drawings:</i></p>
<p><b>21.3.2</b> <b>Vertically ("Plumb")</b></p>	<p><b>Supersede '30mm' with the following text:</b> <i>10mm</i></p>
<p><b>21.4</b> <b>Finished surface structures and fittings</b></p>	<p><b>Supersede clause 21.4 with the following text:</b> <i>For structures and fittings designed to finish flush with the ground/pavement surface or proud of the surface, apply a vertical tolerance on the finished design surface levels as detailed in TS 0521:</i></p>
<p><b>22</b> <b>Connections to existing water mains</b></p>	<p><b>Supersede clause 22 with the following:</b> <i>All work on live mains including under pressure connections, inserted T connections, and extensions of mains shall be constructed in accordance with the approved design by an SA Water authorised contractor (constructor).</i></p> <p><i>An Accredited Contractor may receive a Temporary Authorisation to undertake these works, subject to the acceptance and approval of the SA Water representative.</i></p> <p><b>22.1 Design</b> <i>The Designer is to undertake design of the live connection in accordance with the SA Water standards and WSCM drawings. The Designer, through physical site investigation shall verify the actual location and level of the link-up point, confirm pipe size, material, pipe condition, and location of joints in relation to the existing water reticulation system before work commences. Existing services and other site constraints shall be identified. Physical site investigation works to inform the design shall be undertaken by a SA Water authorised contractor.</i> <i>Reliance on as constructed information is not acceptable.</i></p>

WSA 03 clause	SA Water supplementary information
	<p>No works shall commence until written approval is provided by the SA Water representative or service partner who issues a permit to work on live water main. This is a Hold Point.</p> <p>22.2 Link-Ups by the Constructor</p> <p>All planned outages / shut downs must be undertaken by SA Water / Service Partner who will arrange the necessary shut downs together with notifications and temporary arrangements and subsequent recharging of the mains. Shut downs may be cancelled at the discretion of SA Water should arrangements including weather / fire risk not be suitable.</p> <p>The Constructor shall provide a detailed construction plan to the SA Water Representative. Approval of this is a Hold Point.</p> <p>The construction plan shall include approved design plans, safety, materials, methodology, water quality, program, quality and testing, inspections, risk management, corrosion protection, resourcing and supervision and contingency planning in event of delay, damage or failure.</p> <p>Acceptance of the construction plan and approval to undertake works is at the discretion of the SA Water Representative / Service Partner.</p> <p>The Link-up shall only be carried out by a person who has been authorised to carry out link-ups on SA Water's infrastructure network. The Constructor shall not open or close any valves on active mains.</p> <p>The Constructor must notify SA Water Construction Services and provide a copy of the approved construction management plan with sufficient notice to arrange inspection of the works.</p> <p>The Constructor shall remain on site for at least 30 minutes after the new main has been charged up in case of a delayed failure.</p> <p>In the event of a failure in the new main or water connections at charge-up, SA Water will shut down the main, and the Constructor shall immediately carry out the necessary repairs to make the works safe. Where the shut-down of the new main necessitates the shut-down of an existing main that supplies consumers, the repair work shall be completed as a matter of urgency to enable the existing main to be recharged as soon as possible to minimise the inconvenience to consumers.</p>
<p><b>24</b> <b>Work as constructed details</b></p>	<p><b>Supersede clause 24. with the following text:</b></p> <p>Refer to TS 0103 Survey requirements specifications and TS 0130 for As Constructed data requirements for linear assets for As Constructed drawing requirements.</p>

## A Demands

Where no additional information is available, details in this Appendix may be used as a guide to demand.

There is a difference between building or refreshing a model of an existing system and modelling for a new standalone development. The numbers and tables below are suited to investigating a standalone new development.

### Dual Reticulation Systems

The data set available for SA Water dual reticulation systems is limited. What non-drinking water may be used for in future in new systems in residential, commercial / industrial and public green space applications may vary based on availability and water quality. What may be assumed is dependent on development and project assumptions.

In absence of measurement assume a potable water of **200kL/a/dwelling** and the remainder of consumption for size lot to be attributed to non-drinking water.

In dual reticulation systems public green space would be irrigated with non-drinking water, with consideration of a drinking water back-up supply for key sites.

For non-residential demand the volume attributed to non-drinking water will have to be project specific.

### Typical Demands

Table 1: Typical demand <sup>(1)</sup>

Type of Development	Annual consumption <sup>(3)</sup>	Peak day factor <sup>(4)</sup>	Demand pattern <sup>(2)</sup>
<b>1000m<sup>2</sup> lots residential</b>	400kL/a/dwelling	2.7	SAW_PD_RES
<b>600m<sup>2</sup> lots residential</b>	300kL/a/dwelling	2.7	SAW_PD_RES
<b>200m<sup>2</sup> lots residential</b>	300kL/a/dwelling	2.7	SAW_PD_RES
<b>High density development, residential</b>	200kL/a/dwelling for general high rise. Allow for 1 x 50mm meter, apply as point demand in peak day model	2.7	SAW_PD_RES
<b>School</b>	Allow for 2 x 50mm meters, apply as point demand in peak day model	2.1	SAW_HIND
<b>General Public Institution</b>	Allow for 1 x 50mm meters, apply as point demand in peak day model	2.1	SAW_HIND
<b>Hospital</b>	Allow for 2 x 100mm meters with isolation valve in between, apply as point demand in peak day model	2.1	SAW_HIND
<b>Commercial / Shopping centre</b>	4ML/ha/a, or 1.2kL/a/m <sup>2</sup> effective building area, whichever is larger, or allow for 1 x 50mm meter	2.1	SAW_HIND
<b>Industrial</b>	4,000 – 10,000kL/ha/a or provided by developer	2.1	SAW_HIND
<b>Rural 20mm connection</b>	600kL/a	2.1	SAW_PD_RL
<b>Hotel</b>	Allow for 1 x 50mm meter, apply as point demand in peak day model	2.1	SAW_HIND

**Notes:**

- 1) These are typical values to be used if no additional information is available.
- 2) Typical demand patterns are given in Table 2.
- 3) Annual consumption accounts for a 15 per cent allowance for non-revenue water.
- 4) Peak Day Factor = (peak day average flow)/(annual average daily flow)

**Diurnal patterns**

The consumption patterns to be adopted during modelling are based on the daily diurnal curves developed in SA Water based on network monitoring and historical knowledge and experience. These patterns can be used as the base scenario when no measured patterns are available. To meet the calibration standards, specific patterns have to be developed for individual systems based on flow monitoring.

The following daily diurnal curves are provided in this Appendix:

- SAW\_PD\_RES SA Water's Hot Weather Peak Day Residential Demand Pattern
- SAW\_PD\_RL SA Water's Hot Weather Peak Day Rural Demand Pattern
- SAW\_PD\_RECL SA Water's Hot Weather Peak Day Non-Drinking Water Demand Pattern
- SAW\_HIND SA Water's Hypothetical Industrial/Commercial
- SAW\_WD SA Water's Winter Day Residential Demand Pattern (based on typical weekend consumption).

It is sometimes necessary to model for longer than one peak day, two extended residential curves have been developed, available from SA Water on request when required:

- MONTH-3 Extended SAW\_PD\_RES (0.5 hour time step – 90 days)
- MONTH-6 Extended SAW\_HIND (0.5 hour time step – 90 days).

These curves can be used to model up to 90 days. Both curves are based on standard peaking factors for peak day, peak week, peak two months and peak three months. The MONTH-3 (Extended SAW\_PD\_RES) curves are to be used for residential demands only. Non-residential demands should use MONTH-6 (Extended SAW\_HIND) for the duration of the simulation.

Demands in country lands areas are generally classified as OPEN Code and should use the SAW\_PD\_RL curve initially. If there are simulation problems (i.e. negative pressures in country lands mains) then demands in some areas may need to be treated differently.

Curves for water quality analysis (summer, winter or annual average) must be developed on a project-by-project basis so that the daily modelled demands match (e.g.) the average summer daily WTP output for a summer analysis. If a water quality analysis is required for different seasonal demands, a curve will need to be developed in association with SA Water.

As a base case, the summer water quality analysis can be based on the MONTH-3 and MONTH-6 curve and the winter water quality on the SAW\_WD curve when additional calibration and measurement data are not available.

Table 2: Typical demand patterns (SA Water)

Time (hr)	SAW-PD-RES	SAW-WD	SAW-PD-RECL	SAW-HIND	SAW-PD-RL
0 (24)	0.625	0.635	1.3	0.18	0.45
0.5	0.515	0.572	1.2	0.14	0.44
1	0.455	0.530	1.1	0.11	0.43
1.5	0.425	0.470	0.98	0.1	0.42
2	0.415	0.450	0.9	0.11	0.41
2.5	0.415	0.400	0.85	0.14	0.41
3	0.405	0.355	0.8	0.22	0.42
3.5	0.415	0.330	0.75	0.35	0.43
4	0.435	0.320	0.7	0.64	0.45
4.5	0.445	0.300	0.67	0.82	0.48
5	0.495	0.286	0.66	0.98	0.53
5.5	0.555	0.265	0.81	1.15	0.62
6	0.705	0.302	1.27	1.25	0.74
6.5	0.965	0.371	1.56	1.32	0.92
7	1.415	0.402	1.8	1.37	1.06
7.5	1.675	0.455	1.65	1.42	1.18
8	1.835	0.577	1.35	1.45	1.26
8.5	1.595	0.868	1.07	1.47	1.31
9	1.365	1.260	0.82	1.5	1.3
9.5	1.125	1.551	0.6	1.5	1.28
10	1.005	1.837	0.5	1.5	1.25
10.5	0.935	2.065	0.4	1.5	1.23
11	0.905	2.130	0.33	1.5	1.2
11.5	0.875	2.049	0.29	1.5	1.18
12	0.835	1.930	0.25	1.5	1.17
12.5	0.815	1.837	0.23	1.5	1.16

Time (hr)	SAW-PD-RES	SAW-WD	SAW-PD-RECL	SAW-HIND	SAW-PD-RL
13	0.805	1.710	0.2	1.5	1.16
13.5	0.805	1.572	0.2	1.5	1.17
14	0.815	1.413	0.22	1.5	1.18
14.5	0.825	1.270	0.24	1.5	1.19
15	0.835	1.150	0.26	1.48	1.21
15.5	0.845	1.050	0.28	1.47	1.24
16	0.855	1.016	0.29	1.44	1.3
16.5	0.875	1.020	0.32	1.41	1.38
17	0.905	1.080	0.35	1.35	1.48
17.5	1.005	1.149	0.45	1.3	1.56
18	1.115	1.230	0.65	1.22	1.61
18.5	1.275	1.350	0.85	1.13	1.64
19	1.505	1.450	1.23	1.04	1.66
19.5	1.825	1.500	1.63	0.95	1.62
20	2.055	1.400	2.21	0.86	1.46
20.5	2.155	1.200	2.61	0.75	1.25
21	2.005	1.043	2.8	0.64	1.04
21.5	1.705	0.950	2.64	0.53	0.85
22	1.385	0.820	2.35	0.43	0.7
22.5	1.105	0.736	2.08	0.34	0.58
23	0.895	0.693	1.78	0.23	0.52
23.5	0.755	0.650	1.52	0.21	0.47
<b>Average</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

## B Service pressure

Table 3: Maximum and Desirable service pressure limits for drinking water supply

Service Pressure	Application			
	Residential		Industrial / Commercial	
Maximum Allowable Service Pressure	900kPa	90mH	900kPa	90mH
Minimum Allowable Service Pressure	Customer contract including special characteristics		Customer contract including special characteristics	
Desirable Minimum Service Pressure	200kPa	20mH	200kPa	20mH
Desirable Minimum Static Pressure	350kPa	35mH	350kPa	35mH

### Notes:

1. In the original WSA table 2.3 there is a line item for licence requirement, however in SA there is no explicit licence requirement. This is replaced with Customer Contract and Special Characteristics. Special Characteristics when applied may allow a pressure that is either below or above the minimum and maximum desirable and allowable pressures.
2. Definition of Service Pressure is at the point of connection to a customer's installation at zero flow in the service pipe. This is understood to mean before the customer meter. To be meaningful it must be at a point where pressure may be measured.
3. For hydraulic modelling purposes mains pressure refers to pressure in the main before branch offtake for connection. The hydraulic model typically does not include the branch connection.
4. Values in table 3 are to be considered the minimum standards for customers in Metro areas. Historically connections in non-metro areas were developed with different design criteria, reflected in now historical supply agreements. This came about because of the significant length and sparse interconnectivity of the pipelines involved and the necessity to supply water to the country, mostly for stock purposes. Pressures and continuity of water supply could also be affected. A typical constraint for connections in rural areas is to have 20mm water meters limited to 5 L/min (or slightly higher nominated values in selected areas). In some areas this was a 'hard' restriction with physical limitation in flow rate, whilst in others it was 'soft' with customer expectations managed through supply agreements. These specifics were no-longer visible when we moved to a Standard Contract after the Water Industry Act 2012 with a complete listing of possible Special Characteristics. Customer expectations are now managed using Standard Contract with appended Special Characteristics rather than by Supply Agreement as allowed under previous Act.
5. The system should be designed so that the minimum service pressure for industrial and commercial users is larger than the desirable minimum. That is, we do not purposefully design to a achieve a minimum service pressure, rather service pressure should be above the minimum service pressure. The line item for 'licence requirement' is left in to highlight there is not an explicit Retail Code requirement in SA. SA Water has adopted the 'desirable' minimum rather than a minimum 'allowable'. Nonetheless there is a SA Water systems planning design expectation that we will not purposefully design new systems that will result in service pressures less than 20 mH, or that we purposefully allow existing systems that already have low service pressures reduce further below 20 mH.

Table 4: Allowable reduction of minimum service pressure <sup>(1)</sup>

Existing Minimum Service Pressure (mH <sub>2</sub> O)	Max Reduction in Minimum Service Pressure (mH <sub>2</sub> O)	Minimum value of New Minimum Service Pressure (mH <sub>2</sub> O)
>90	>30	70
90	20	70
80	10	70
70	7	63
60	6	54
50	5	45
40	4	35
30	3	27
20	0	20

**Notes:**

1. The current policy, regulations and customers' contracts do not nominate flow and/or pressure specific values. They also do not explicitly articulate how the level of service may deteriorate in time, for example, arising from larger demands in existing customer base and or growth in the network. In the absence of regulated direction, new individual developments impacting existing system should be designed so that the impact on the level of service of existing customers is minimized. The table specifies the maximum reduction in level of service against a nominated base case supply scenario. Some judgement is required if making step change to the minimum value in context of existing customers who may already have configured their systems based on the higher pressure.
2. Intent of augmentation recognizes that trunk mains have a longer design outlook compared to other assets, which can be built in modules. It is intended that design of trunk mains are designed for the life of the asset (e.g., 100 years). This can be for a number of reasons:
  - a. Available space to construct parallel trunk mains to incorporate growth is becoming limited due to the increase congestion of third-party utilities
  - b. If growth is slower and the main can be downsized the replacement cost is reduced by being able to line the main
  - c. Has a lower NPV compared to constructing a parallel trunk main

## C Minimum pipe sizes

That SA Water adopts the following correlation between WSA Water Supply Code 03 and NCC building categories:

Table 5: Alignment of WSA Water Supply Code 03 and the NCC Building Code

WSA Water Supply Code 03	NCC
Residential	Class 1 buildings
Residential	Class 2 buildings
Residential	Class 3 buildings
Commercial	Class 5 buildings
Commercial	Class 6 buildings
Commercial	Class 7 buildings
Industrial	Class 8 buildings
Public Utilities	Class 9 buildings
Exercise discretion	Class 10 buildings and structures

Table 6: Minimum pipe sizes for particular development types

Zoning/ Development	Minimum pipe size (DN) <sup>(1,2,3)</sup>
Low and medium density residential	100
High density residential (≥4 storeys <8 stories)	150
Multiple developments or high density residential (≥8 storeys)	200
Industrial and commercial, Public Utilities	150

### Notes:

3. Nominal internal diameter
4. In mixed high-rise development adopt the larger of the two mains sizes
5. The main sizes in Table 6 may be used for the rural system, subject to modelling confirmation.

Considering that minimum pipe diameters have been established to ensure adequate flow rates and residual pressures, including a contribution to basic firefighting capability, the following is applied to public utility (NCC Class 9) buildings:

- a. Minimum DN100 if fire connection flow is 10L/s or less, for example, 1 feed hydrant.
- b. Minimum DN150 if fire connection flow is 20L/s or less, for example, 2 feed hydrants, or ≥4 storeys.
- c. Minimum DN200 if fire connection flow is greater than 20L/s, for example, 2 feed hydrants + sprinklers, 3 feed hydrants or more, or ≥8 storeys.

These minimum requirements do not apply retrospectively and are triggered when a new fire connection is applied, or when designing for greenfield development.

Table 7: Minimum pipe sizes for particular rural systems

Zoning/Development	Minimum pipe size (mm)	Note
Rural Low and medium density residential	DN100	WSA03

## D Pipe Class and Materials

This Appendix specifies all acceptable materials and their minimum allowable pressure rating authorised by SA Water for new installations up to a maximum size of DN375 for:

- Drinking water systems
- Non-Drinking water systems.

Where a project involves the installation of any product with a diameter larger than DN375 or PE pipe larger than DN315, or a pipe not included in the approved products standard, individual approval from SA Water's Representative is required.

As a minimum, for non-standard products, the designer shall provide the SA Water Representative with all engineering documentation, including data sheets or manufacturer information. Following receipt of all relevant engineering documentation, SA Water will review the information provided and provide advice regarding the suitability of the product.

Note: Full details of Authorised Products for Water Systems are available in SA Water Technical Standard TS 0503.

### Allowable Pipe Pressure Rating

SA Water specifies PVC Series 2, PN 20 rated pipe as a minimum standard for use within its Drinking Water and Non-Drinking Water reticulation networks within the **CBD of Adelaide and North Adelaide**.

SA Water specifies PVC Series 2, PN 16 rated pipe as a minimum standard for use within its Drinking Water and Non-Drinking Water reticulation networks within Metropolitan Adelaide and regional areas.

SA Water requires a 100-year asset life for new water mains. This requirement is consistent with WSA 03, Table 1.2 and the requirements of majority of Australian Water Authorities.

### Deviation from the Standard Pipe Pressure Rating

Where appropriate, SA Water may require the use of a higher rated pipe-based applications where a fixed supply pressure is known.

### Allowable Pipe Sizes

SA Water nominal pipe sizes (DN) for new water reticulation installations are:

- DN100
- DN150
- DN200
- DN250
- DN300, and
- DN375

Above this size, pipe design should be based on hydraulic requirements.

DN 63 Polyethylene pipe should only be used when approved by SA Water and when required for water quality requirements and then in cul-de-sacs only.

### Reticulation Pipes Sizing - PE Pipe

Polyethylene pipe (which is specified on the true outside diameter) has an equivalent size range as follows. Refer WSA03 Appendix B.

Standard Pipe Size	PE Pipe Equivalent
DN50	DN63
DN100	DN125
DN150	DN180
DN200	DN250
DN250	DN315

Use of PE pipes with diameters larger than DN315 shall require specific SA Water approval.

### Connection Pipe Sizing – PE Pipe

PE pipe is also used for property service connections (main to meter) in 25mm, 40mm, 50mm and 63mm sizes

Connection Pipe Size	PE Pipe Equivalent
DN20	DN25
DN25	DN25 (DN32 not preferred)
DN40	DN50
DN50	DN63

### Allowable Pipe Materials

The following pipe materials have been assessed as acceptable for use within SA Water's water reticulation network:

- Polyvinylchloride (PVC)– Modified (PVC-M) Series 2
- Polyvinylchloride (PVC) – Oriented (PVC-O) Series 2 when approved by the SA Water representative
- Polyethylene (PE) - PE100
- Steel Cement Lined (SCL) (Sintacote external coating)
- Ductile Iron Cement Lined (DIDL) (refer Notes below).

The **preferred** pipe material applications are as follows:

Pipe DN	Preferred material
100 < DN ≤ 375	PVC-M, SCL and DIDL,
<DN100	PE pipe
Property Connections	PE pipe

#### Notes:

1. Where pipework is installed in a part of the network where the dynamic pressure response is confirmed by SA Water as significant PVC-M or PVC O is preferred.
2. The factors relating to damage to pipe during installation, soil loads and fittings, must be accounted for in the construction specification and practices to avoid premature shortening of the service life of the PVC and PE pipes due to fatigue propagation from scratches, notches, cuts and other defects in the pipe walls after installation.

## E Notice of intent

**Notices as required in the Water Industry Act are applicable.**

### Water Industry Act 2012

The *Water Industry Act 2012 Part 6* requires the protection of infrastructure

- S49 – Encroachments

*a person must not, without lawful authority...encroachment over any water/sewerage infrastructure...*

- S50 - Protection of infrastructure and equipment

*a person must not, without lawful authority ....interfere with- ....water infrastructure...sewerage infrastructure*

- S51 - Notice of work that may affect water/sewerage infrastructure

*A person who proposes to do works near water/ sewerage infrastructure must give the relevant water industry entity at least 14 days notice of the proposed work...a person who does work must comply with - ...reasonable requirements made by the water industry...*

- S52- Duty to give notice before paving a road etc (including roadworks, kerbing, footpaths, drainage)

*The person authorising or intending to do the works must give the water industry entity 14 days notice if there is water/sewerage infrastructure and the water industry entity within 14 days must advise the person of any new water/sewerage to be installed and of any interference that is to be expected to be caused to existing water/sewerage infrastructure.*

S52 describes allocation of costs for alteration to any water/sewerage infrastructure.

### Water Industry Regulations 2012

The *Water Industry Regulations 2012 Part 4 – Protection and use of infrastructure, equipment and water and powers in relation to installations*

- S13-15 – Protection of infrastructure

*planting of trees etc on public land. For the purposes of protecting sewerage and water infrastructure trees species and clearances are described and requirements for written approval from the water industry entity are required where clearances and tree species are not met.*

### Notification to the Department for Infrastructure and Transport and/or Council

Unless varied by a contract, where water mains and water connections are laid in public roads, the Constructor shall notify the authority responsible for the road (local government or DIT) at least five full working days before commencing work.

### Acknowledgment of Intention to Carry out Works

Unless varied by a contract, the Constructor shall provide the SA Water representative and Superintendent's Representative with a written acknowledgment from the authority responsible for the road (local government or Department for Infrastructure and Transport) of the Constructor's intention to carry out works before commencing work.

### Shutting Down Live Water Mains / Link-Up to Live Water Mains

The Constructor shall give the SA Water representative a minimum of 10 working days notice in writing, following approval of the construction plan in accordance with clause 22 of this standard, of the requirement for the shut-off of the main to carry out any link-up.

**Charge-Up and Disinfection of Mains**

The Constructor shall give the SA Water Representative a minimum of 10 full working days' notice, in writing, requesting the charge-up and disinfection of the non-commissioned water reticulation system.

**Testing**

Notification shall be in accordance with TS 0900.

**Access to Easements**

Except in emergencies, owners shall be given forty-eight hours notice, in writing, prior to requiring access to easements on private property. Properties accessed must be left in a safe, neat and tidy condition.