

TWEED SHIRE COUNCIL

DEVELOPMENT DESIGN SPECIFICATION

D11

WATER SUPPLY

VERSION 1.9

SPECIFICATION D11 – WATER SUPPLY

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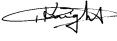

CITATION





This document is named "Tweed Shire Council, Development Design Specification D11 - Water Supply".

ORIGIN OF DOCUMENT, COPYRIGHT

This document was originally based on AUS-SPEC-1\NSW-D11 Sep 2000 (Copyright), AUS-SPEC appreciates the role of the NSW Water Directorate in comprehensively updating the design and construction specifications for water and sewer works. Substantial parts of the original AUS-SPEC document have been deleted and replaced in the production of this Tweed Shire Council Development Specification. The parts of the AUS-SPEC document that remain are still subject to the original copyright.

VERSIONS - TWEED SHIRE COUNCIL DEVELOPMENT SPECIFICATION D11 WATER SUPPLY

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director
1.1	Original Version		1 July 2003	
1.2	Amendments to referenced standard drawings Delete reference to switch cabinet standard drawing	D11.03 D11.25-10	1 June 2004	
1.3	Updated references to Standard Drawings and WSAA Water Supply Code. Reference new Mechanical and Electrical Specifications to replace MEW E101 Design demands for conveyancing of water and service storage sizing - new clause Change from peak instantaneous demand to peak hourly demand for reticulation design Fire flow requirements Separation requirements for reticulation mains per WSAA Code Amend minimum pipe classes	Various D11.05 D11.06 D11.06 D11.08 D11.11, D11.13	18 August 2010	
1.4	Amend fire fighting pressures Amend Peak Daily Demands for residential development	D11.06.3 D11.07.1	1 February 2011	
1.5	Addition to Pipeline regarding Trunk Main Connections Amended Pipe Materials - General Moved - DUCTILE IRON (DI) PIPE AND FITTINGS from D11.13 to D11.11 Moved - UNPLASTICISED, MODIFIED PVC AND ORIENTED PVC from D11.11 to D11.12	D11.07 D11.10 D11.11 D11.12	20 January 2014	

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director
	<p>Moved - ACRYLONITRILE BUTADIENE STYRENE (ABS) PIPE AND FITTINGS from D11.12 to D11.13</p> <p>Wording "Other Materials" added to Headings</p> <p>Addition to Pump Stations - General, Flow Meters</p> <p>Addition to Reservoirs - General, Flow Meters</p>	<p>D11.13</p> <p>D11.12, D11.13, D11.14, D11.15, D11.16, D11.17</p> <p>D11.24.13</p> <p>D11.32</p>		
1.6	<p>Definition regarding reference to Manager or Director within document</p> <p>Change from Director of Community and Natural Resources to Director</p>	<p>D11.03</p> <p>D11.07</p>	<p>13 May 2014</p> <p>13 May 2014</p>	
1.7	<p>Change from peak instantaneous demand to peak hourly demand for reticulation design</p> <p>Addition of stop and scour valves added to Location</p> <p>Addition of minimum cover of water mains</p> <p>Removal of additional pipe materials</p> <p>Updated references to Standard Drawings and WSAA Water Supply Code and other Codes</p>	<p>D11.01.2</p> <p>D11.08.1</p> <p>D11.08.4</p> <p>D11.12, 13, 14, 16 & 17.</p> <p>Various</p>	<p>20 December 2017</p>	
1.8	<p>Inclusion of Nominal pipeline diameters</p> <p>Inclusion of bulkheads and trench stops in designs</p> <p>Inclusion of water meter</p> <p>Inclusion of stop valves on trunk mains</p> <p>Addition of service connections</p>	<p>D11.07</p> <p>D11.10.12</p> <p>D11.17</p> <p>D11.18.7</p> <p>D11.22</p>	<p>25 September 2019</p>	
1.9	<p>Vents in valve pits</p> <p>Change of peak hour design</p> <p>Update of Minimum Cover over pipes</p> <p>Inclusion of Stairs</p>	<p>D11.04</p> <p>D11.05</p> <p>D11.08</p> <p>D11.29</p>	<p>07 December 2020</p>	

DEVELOPMENT DESIGN SPECIFICATION D11

WATER RETICULATION

GENERAL

D11.01 SCOPE

1. This Specification is for the design of water supply systems for subdivisions and other development projects. **System**
2. This Specification contains procedures for the design of the following elements of a water supply system. **Elements**
 - (a) Reticulation
 - (b) Pump Stations
 - (c) Reservoirs
 - (d) Pressure zones

The subdivider/developer is to provide a water supply system, sourced from Council's preferred connection point, that will deliver design peak hourly demand (PHD) at a minimum 20m head to each allotment.

Some subdivisions/developments may be significant distances away from the nominated connection point or at elevations that are too high to be serviced adequately by existing system pressure. In such cases the provision of PHD will require substantial system upgrade and/or installation of local pumping stations and reservoirs.

3. Except as required otherwise in this specification, the design of reticulation and pump station components shall comply with the Water Services Association of Australia's publication WATER SUPPLY CODE OF AUSTRALIA of Australia, WSA 03- 2011, PART 1- Planning and Design unless specified otherwise herein and should be constructed in accordance with the DEVELOPMENT CONSTRUCTION SPECIFICATION - C401 WATER RETICULATION and the WATER SUPPLY CODE of Australia, WSA 03- 2011, PART 2 Construction). **Compliance**
4. A reticulated water supply system designed in accordance with this specification is to be provided for
 - (a) All urban subdivision allotments and rural living (<1ha) subdivision allotments.
 - (b) Urban parks, reserves, public open spaces
 - (c) Sewerage pumping stations, public toilets and change rooms
 - (d) Commercial development allotments

The system shall include all connections and links to the existing water supply system and provision for extension for future downstream or adjacent development.

D11.02 OBJECTIVE

1. The objective of a water supply system is to provide to the consumer a reticulated (either potable or dual potable/raw) water supply to meet the demands imposed upon **Water Supply**

it by both the consumers and fire fighting requirements. Consumer requirements shall be met by providing a water main and allowing an appropriate point of connection for each individual property.

D11.03 REFERENCE AND SOURCE DOCUMENTS

In cases of conflict or contradiction within this or other Council Specifications, the Manager or Director is defined as "the Manager or Director responsible for water supply and wastewater services or appointed delegate at Tweed Shire Council".

The Manager or Director

In cases of conflict or contradiction, unless otherwise specified, the provisions of this Specification will prevail over all reference documents and prevail over all Tweed Shire Council (TSC) Standard Drawings. TSC Standard Drawings shall prevail over any other standard drawings.

1. Documents referenced in this Specification are listed below whilst being cited in the text in the abbreviated form or code indicated. The Designer shall possess, or have access to, the documents required to comply with this Specification.
2. References to the WATER SUPPLY CODE OF AUSTRALIA are made where there are parallel sections or equivalent clauses to those in this Specification. Where not called up as part of this Specification, these references are identified by part and section numbers and enclosed in brackets thus (WSA Edition, Part, Section).

Documents

Water Reticulation Code

(a) Council Specifications

C242 – Development Construction Specification Flexible Pavements

C244 – Development Construction Specification Sprayed Bituminous Surfacing

C401 - Development Construction Specification Water Reticulation.

D1 - Development Design Specification Road Design.

D5 - Development Design Specification – Stormwater Drainage Design

D13 - Development Design Specification Engineering Plans (Subdivisions)

EL01-EL19 - Electrical Specifications.

ME01-ME04 - Mechanical Specifications

Driveway Access to Property Part 1 – Design Specification

Driveway Access to Property Part 2 – Construction Specification

(b) Australian Standards

Australian Standards

References in this Specification or the Drawings to Australian Standards are noted by their prefix AS or AS/NZS.

The Designer shall use the latest edition of the Australian Standards, including amendments and supplements, unless specified otherwise in this Specification.

- | | | |
|-------------|---|--|
| AS 1102 | - | Graphical symbols for electrotechnical documentation (various) |
| AS/NZS 1111 | - | ISO metric hexagon commercial bolts and screws |
| AS/NZS 1112 | - | ISO metric hexagon nuts including thin nuts slotted nuts and castle nuts |
| AS 1214 | - | Hot dipped galvanised coatings on threaded fasteners (ISO metric coarse thread series) |
| AS/NZS 1260 | - | PVC pipes and fittings for drain, waste and vent applications |
| AS 1281 | - | Cement mortar lining of steel pipes and fittings |
| AS 1432 | - | Copper tubes for plumbing, gasfitting & drainage applications |

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AS 1444	-	Wrought alloy steels – Standard, hardenability (H) series and hardened and tempered to designated mechanical properties
AS 1449	-	Wrought alloy steels – Stainless and heat resisting steel plate, sheet and strip
AS 1460	-	Fittings for use with polyethylene pipes
AS/NZS 1477	-	PVC pipes and fittings for pressure applications
AS 1579	-	Arc welded steel pipes and fittings for water and wastewater
AS/NZS 1594	-	Hot rolled steel flat products
AS 1646	-	Elastomeric seals for waterworks purposes.
AS 1657	-	Fixed Platforms, walkways, stairways and ladders – Design, construction and installation
AS 2129	-	Flanges for pipes, valves and fittings
AS 2200	-	Design charts for water supply and sewerage
AS/NZS 2280	-	Ductile iron pressure pipe and fittings
AS/NZS 2566.1	-	Buried flexible pipelines – Structural design
AS 2634	-	Chemical plant equipment made from glass fibre reinforced plastics (GRP) based on thermosetting resins
AS 2638	-	Sluice Valves for waterworks purposes
AS 2837	-	Wrought alloy steels – Stainless steel bars and semi-finished products
AS 3500	-	National Plumbing and Drainage Code
AS 3518.1	-	Acrylonitrile Butadiene Styrene (ABS) pipes and fittings for pressure applications – Pipes
AS 3518.2	-	Acrylonitrile Butadiene Styrene (ABS) pipes and fittings for pressure applications – Solvent cement fittings
AS 3571	-	Glass filament reinforced thermosetting plastics (GRP) pipe - Polyester based - Water supply, sewerage and drainage applications
AS 3578	-	Cast iron non-return valves for general purposes
AS 3579	-	Cast iron wedge gate valves for general purposes
AS 3680	-	Polyethylene sleeveings for ductile iron pipelines
AS 3688	-	Water supply – Copper and copper alloy body compression and capillary fittings and threaded-end connectors
AS 3691	-	Solvent cement and priming (cleaning) fluids for use with ABS pipes and fittings
AS 3735	-	Concrete structures for retaining liquid
AS 3855	-	Suitability of plumbing and water distribution systems products for contact with potable water
AS 3862	-	External fusion-bonded epoxy coating for steel pipes
AS 3952	-	Water supply- DN80 spring hydrant valve for general purposes.
AS 3996	-	Metal access covers, road grates and frames
AS 4020	-	Testing of Products for use in contact with drinking water
AS 4041	-	Pressure piping
AS 4058	-	Precast concrete pipes (pressure and non-pressure)
AS 4087	-	Metallic flanges for Waterworks purposes.
AS 4100	-	Steel structures
AS/NZS 4129(Int)	-	Fittings for polyethylene (PE) pipes for pressure applications.
AS/NZS 4130	-	Polyethylene (PE) pipes for pressure applications.
AS/NZS 4131	-	Polyethylene (PE) compounds for pressure pipes and fittings.
AS/NZS 4158	-	Thermal bonded polymeric coatings on valves and fittings for water industry purposes
AS/NZS 4321	-	Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
AS/NZS 4765(Int)	-	Modified PVC (PVC–M) pipes for pressure applications
HB 48	-	Steel structures design handbook

Where not otherwise specified in this document, the Contractor shall use the latest Australian Standard available within two weeks of close of tenders

(c) Other

Codes

Institute of Public Works Engineering Australia (IPWEA)
 - Streets Opening Conference Information Bulletin on Codes and Practices (Sections 3 and 4 detailing locations and depths of other services).

PWD-WSIM - Water Supply Investigation Manual
 PWD - Safety Guidelines for fixed ladders, stairways, platforms and walkways.

Building Codes Board of Australia
 - Building Code of Australia - PART E1, Fire Fighting Equipment.

Plumbing Code of Australia (PCA)

Water Services Association of Australia (WSAA)

WSA 03-2011 - WATER SUPPLY CODE OF AUSTRALIA
 WSA 03-2011 - PRODUCT AND MATERIAL INFORMATION AND GUIDANCE
 WSA03-2002 - WATER SUPPLY CODE OF AUSTRALIA (STANDARD DRAWINGS)
 WSA PRODUCT SPECIFICATIONS FOR PRODUCTS AND MATERIALS - WSA PS 200 TO 404 (Where Relevant)

(d) Standard Drawings that apply to this section:

Drawings

The following Tweed Shire Council standard drawings shall be used:

- S.D.301 Water Reticulation Layout – Cul-de-Sacs
- S.D.302 Property Service Layout – DN 50 or Smaller Services
- S.D.311 Automatic Air Release Valve Installation Details
- S.D.312 Sluice Valve Installation Details
- S.D.313 Fire Hydrant Installation Details
- S.D.314 DN100 Pressure Reducing Valve Installation Details
- S.D.316 Marking for Location of Hydrants
- S.D.320 Property Services Connection to Main
- S.D.321 DN20 & DN25 Property Service Details
- S.D.322 DN40 & DN50 Property Service Details
- S.D.323 DN50 or Smaller Property Service with DN100 or Larger Fire Service
- S.D.324 DN100 or Larger Property Service
- S.D.325 DN100 or Larger Property Service with DN100 or Larger Separate Fire Service
- S.D.327 DN 100 or Larger Fire Sprinkler Service
- S.D.341 Trench Drainage Bulk Heads and Trench Stops

WATER SUPPLY CODE OF AUSTRALIA drawings are to be used in preference to DPWS Standard Drawings (WSA03-2002, Standard Drawings WAT-1100 to 1400 series)

DESIGN CRITERIA

D11.04 GENERAL

- | | | |
|----|--|----------------------------------|
| 1. | Water supply system design criteria shall be in accordance with Water Supply Code of Australia WSA 03-2011, Part 1, unless directed otherwise by this specification. | Standards |
| 2. | Council will provide: | Design
Responsibility |
| | (a) Details of the existing water supply system in the area and any significant proposed alterations | |
| | (b) Preferred connection point(s) | |
| | (c) Requirements for larger trunk mains required in the subdivision or development for future expansion | |
| | (d) Any special requirements | |
| | (e) For larger subdivisions where there may be significant impact on Council's system, to test water supply options, Council may provide boundary condition information from its trunk water supply system computer model, or if required allow access to the model. | |

The Subdivider/Developer's Designer shall:

- (a) Conduct pressure/flow tests at the preferred point of connection
- (b) Conduct necessary modelling of proposed water supply networks to ensure compliance with all design criteria
- (c) Produce a water supply strategy for supplying water supply to the boundary of each lot. Water reticulation mains must be provided to the boundary of each lot with the service line and meter installed perpendicular to the water main.
- (d) Design the subdivision/development water supply system including the connections and links to the existing system and any provisions or extensions required to provide for future downstream or adjoining development in accordance with this specification.
- (e) The design will include sizing pipework; selection of pipeline material types and class; route selection; evaluation of topographical, foundation, geotechnical and environmental issues with appropriate design solutions; provision of easements; provision of clearances; arrangements for shared trenching; provision, location and sizing service connections; types and locations of appurtenances (stop valves, PRVs, air valves, hydrants and fire services); scours/pump out branches; termination details; bulkheads and trench stops, locations and details of thrust blocks and anchors.
- (f) The design shall ensure hydraulic adequacy including: compliance with maximum and minimum operating pressures; acceptable flow velocities; compliance with assessed demand, including fire-fighting requirements.
- (g) Design of pumping stations, service reservoirs and associated power supply, control systems, site facilities and access; for areas that due to remoteness from the existing water supply system or high altitude, are

unable to meet water supply design criteria without provision of booster pumping and local service reservoirs.

- (h) Design plans shall include within the notes a statement that all works associated with live water connections shall be carried out by Tweed Shire Council accredited contractors under supervision by Tweed Shire Council.

- 3. The Designer shall take into account the location and type of valve required considering maintenance and repair requirements, the need for double air valves with integral isolating valve on mains or single air valve with isolating valve on reticulation mains, and scour points. Air valves shall have induct/ educt vents installed within the pit.

Valve Type and Location

- 4. At Development Application Stage a Water Management concept report including assumptions, calculations used in determining pipe sizes, design demands and layout plans shall be provided. Other pertinent considerations including zone boundaries and staging of capacity information shall be submitted to TSC for approval. (see Development Design Specification D13 - Engineering Drawings (Subdivisions)).

Detail Design Information

For small developments, Clause D11.05.1 shall be submitted for approval provided as a minimum. For large developments including subdivisions, the report shall include (where applicable) how capacity for future stages is incorporated and any upgrade works to either the existing or future system to enable the servicing of the development including the provision of a network analysis of the reticulation system detailing the pressure and velocity distribution.

- 5. At Construction Certificate Application Stage or Section 68 Application, Detail Design Engineering plans shall be submitted to TSC for approval. Design shall be as outlined in Development Design Specification D13, (Groups D22 to D24) and C401 - Development Construction Specification Water Supply System.

Design Information

D11.05 DESIGN DEMANDS FOR CONVEYANCING OF WATER AND SERVICE STORAGE SIZING

- 1. Design shall be based upon the WSA 03-2011, 1, 2 System Planning demand estimation methodology but with the following qualifications and parameter selection guidelines:

Design Loading Calculations

- (a) One Equivalent Tenement (ET) shall be 2.8 Equivalent Persons (EP)
- (b) Peak hourly demands shall be used as per the following table:

Residential development including unit developments	0.05L/s/ET
Commercial development	1.2L/s/ha
Light industrial development	1.2L/s/ha
Heavy industry, high usage, schools, hospitals etc	Individual Assessment

- (c) A copy of the peak hour demand design loading calculations and ET assumptions shall be submitted to Council for approval.

- 2. Demand for water mains servicing industrial and commercial areas shall take into consideration the type of development envisaged or existing, the guidance provided by WSA 03-2011 and other pertinent information such as Council's Fees

Demands

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and Charges document. Water demands for other industries shall be as detailed in the Development Construction Specification - C401 Water Reticulation.

- Average Day Demand -- 370 L/p day (includes allowance for commercial, industrial and non-revenue water)

Maximum Day Demand -- 700 L/p day (includes allowance as above).

D11.06 RETICULATION PRESSURE AND FIRE FLOW

- Reticulation systems shall be designed to supply peak hourly demand by gravity while maintaining a minimum pressure of 200kPa (20m). (WSA 03-2011, Part 1, Section 2.5.3). **Design Pressures**
- Fire flow is to be provided within the reticulation system with a minimum residual fire fighting head of 15m at the demand location and concurrent with the peak hour demands listed above and positive residual head throughout the system. **Fire Fighting**

Water mains required for fire-fighting purposes in the development shall be designed in accordance with the Building Code of Australia.

Fire flows shall be:

Residential including unit development not greater than 3 storeys	11 L/s
Local commercial development of limited extent	15 L/s
Commercial, industrial and multi-storey residential	22 L/s

- Under no circumstances shall the pressure be able to equal or exceed the safe working pressure of the reticulation pipe material. The effect of water hammer is to be taken into account for the maximum pressure. **Maximum Pressure**
- The desirable maximum pressure is 780 kPa. Zoning of the reticulation system by means of pressure reducing valves (PRV's) may be necessary to achieve these pressures across the development. **Desirable Maximum Pressure**
- The Designer of large developments shall provide a network analysis of the reticulation system detailing the pressure and velocity distribution after consultation with TSC (see D11.05.4) **Network Analysis**

D11.07 PIPELINE

- Trunk mains directly supplying reticulation systems shall be designed as part of the reticulation system to carry peak hourly demands. (WSA 03-2011, Part 1, Sections 2 and 5) **Trunk Mains**

The following Peak Daily Demands shall be used as a guide for assessing the design demand levels for residential development:

EQUIVALENT PERSON (EP)	:	700 litres per day
House and Duplex	:	2.8 EP
Home Unit and Mobile Home	:	0.75 x 2.8 EP

- Mains feeding service reservoirs shall be designed to carry peak daily demands over 24 hours in the case of gravity mains and 22 hours in the case of rising mains. **Peak Daily Demand**

- | | | |
|-----|--|--|
| 3. | Reticulation mains shall be looped to eliminate dead ends unless permitted otherwise by TSC. | <i>Looped Mains</i> |
| 4. | Where a dead end is permitted to provide for future extension from staged development, the end shall be fitted with an anchored stop valve, hydrant bend and hydrant. | <i>Staged Development</i> |
| 5. | Wherever possible, the development shall be serviced from two or more trunk mains to avoid the loss of supply in the event of maintenance or breakage. | <i>Loss of Supply</i> |
| 6. | Each dwelling shall have an individual service tapped from the main and extending 300mm inside the lot boundary. Water services shall be no longer than 20m from the water main unless permitted otherwise by the Director. Individual services shall not be laid across other properties; ie: services shall be located within the road reserve directly to the property. Where this is not possible, easements may be provided over the water services where approved by the Director. | <i>Individual Service</i> |
| 7. | Valves are to be buried. Access to valves shall be through a valve box designed to TSC standard drawings S.D. 311 and S.D. 312. For larger diameter valves, alternative designs shall be submitted for Council's approval. | <i>Valve Chambers</i> |
| 8. | Metal access covers shall be manufactured in accordance with AS 3996. The Designer shall ensure that air valve covers have adequate openings for air exchange. | <i>Access Covers</i> |
| 9. | Stop valves shall be clockwise closing. | <i>Valve Closing</i> |
| 10. | The Designer shall provide for ease of valve maintenance within valve chambers, where provided, and select valve types such that servicing of the valve can be effected without removal from service, wherever possible. | <i>Valve Maintenance</i> |
| 11. | In all cases pipe sizes and residual pressure shall be designed to cater for fire fighting flows. | |
| 12. | Direct property connections to existing Trunk main infrastructure shall not be approved unless authorised by the Director. | <i>Property connection to Trunk Mains</i> |
| 13. | Acceptable nominal pipe diameters for water supply are 100, 150, 200, 250, 300, 375, 450, 525 and 600mm. Use of other diameter pipelines shall be subject to approval of the Director. | <i>Pipeline Diameters</i> |

D11.08 LOCATION

- | | | |
|----|---|---------------------------------|
| 1. | It is Council's preference for water reticulation to be located within road reserves. In designing the reticulation system, standard locations shall be followed, as detailed below: | <i>Standard Location</i> |
| | (a) Reticulation mains shall be laid in road reserves in compliance with TSC's standard footpath allocation for public utilities, see TSC D1 – Road Design, Section 15 and TSC SD 006 Service Locations in Roadways. | |
| | (b) Reticulation mains shall be located in accordance with WSA 03-2011-1, 5.4 obeying all separation requirements, unless otherwise directed by TSC. | |
| | (c) Valves shall be located to avoid conflict with driveways, telephone house service pits and underground electrical boxes. Stop valves shall be located so that approximately 20 dwellings can be isolated for shutdowns. | |

- (d) Stop valves shall be located at intersections of reticulation mains to enable isolation of each pipeline. Where new water main works are proposed for subdivisions, stop valves shall be installed where the new main connects to the existing main to enable pressure testing.
 - (e) Hydrants shall be located on all reticulation mains. The interval between hydrants shall not exceed 60 metres, and they shall also be placed at all high and low points of the main, and at dead ends. Dwellings in urban areas should be located within 60 metres of a hydrant for firefighting purposes.
 - (f) Scour valves shall be located at the low points of all reticulation mains.
2. Water mains shall be located within road reserves and not located on private property unless authorised by the Director. Water service connections shall not be across other lots.
3. Where reticulation water mains are permitted on private property, they shall be located in an easement of minimum width three metres. Trunk water mains 300mm or larger shall be located in a five meter minimum easement. Unless there are compelling reasons to the contrary, the water main shall be located in the centre of the easement. A Registered Surveyor shall survey easements and pipelines.
4. Cover over pressure mains shall be:

The minimum depth of cover to be provided for pressure mains, measured vertically from the finished ground level to the top of any socket, shall be as follows:

Non-Trafficable areas

• General (parks, footways, easements etc.)	500mm
• Driveways in residential areas	500mm
• Footways in local road reserve	500mm
• Footways in major roads and motorway reserves	600mm
• Footways in industrial/commercial areas	600mm
• Embankments	750mm

Trafficable areas

• Driveways in industrial/commercial areas	600mm
• Carriageways and verges of sealed local roads	600mm
• Carriageways and verges of major roads	750mm
• Carriageways and verges of unsealed roads	750mm
• Carriageways and verges of motorways	1200mm

The minimum depth of cover may be required to be locally increased to accommodate the effective heights of stop valves, hydrants and other appurtenances. Where a pressure main may be subject to abnormal loading during construction, temporary (or permanent) measures shall be taken to ensure that the water main is not overloaded (ie: increasing depth of cover to greater than 750mm). Where approved by TSC, lesser cover may be provided with special protection of the pipeline shown on the design plans.

D11.09 UNSTABLE AREAS

- | | | |
|----|---|---|
| 1. | The pipe jointing system selected shall be capable of accepting ground movements, without impairing the water tightness of the joint. For areas with high ground strains a pipe jointing system using shorter effective length pipes and/or deep socket fittings shall be used. | <i>Geotechnical Issues, Pipe Jointing System</i> |
|----|---|---|

In areas of known or suspected mass movement, subsidence or land slip, a geotechnical engineer's investigation and report is required recommending design/construction techniques required to ensure that the expected working life of the system will not be compromised by geotechnical risks.

MATERIALS**D11.10 GENERAL**

- | | | |
|----|--|--|
| 1. | Ductile iron, cement lined (DACL) pipes and fittings shall be used for water reticulation unless otherwise approved by TSC. | <i>Type</i> |
| 2. | The working pressure of pipes, fittings, valves and hydrants shall be fit for the purpose in accordance with the relevant Australian Standard for the material and shall be at least 1568 kPa (160m). | <i>Working Pressure</i> |
| 3. | Where water pipes are to be located in close proximity to other service pipes and in dual systems, or where there is the likelihood of the pipes not being recognised as water pipes, the Designer shall provide for the pipes to be colour coded and shown on the Drawings accordingly. Sewer pipe colours shall NOT be used for water pipes. | <i>Colour Coding</i> |
| 4. | The Designer shall show on the Drawings the extent of external protection required to be undertaken by the Contractor. External protection shall be shown to comply with C401- Water Reticulation. | <i>External Protection</i> |
| 5. | Unless approved by TSC, no water main shall be located above ground. The Designer shall obtain approval from TSC prior to completion of the design for any above ground water mains. | <i>Above Ground Water Mains</i> |
| 6. | The Designer shall allow for adequate working area, waste removal and transport arrangements where scouring points or pipe inspection locations are nominated. Scours shall drain to a point where the discharge is readily visible and shall not drain to stormwater manholes/ channels or extend across roadways. (WSA 03-2011, Part 1, Section 8.6) | <i>Scour Control</i> |
| 7. | The minimum diameter of all pipes shall be 100mm unless otherwise determined by TSC. In commercial, industrial or high-rise building areas the minimum shall be 150mm. In all cases pipe sizes and residual pressures shall be designed to cater for fire fighting flows. (WSA 03-2011, Part 1, Section 3.1) | <i>Minimum Diameter Pipelines</i> |
| 8. | The Designer shall take regard of the limits of use for the pipeline system materials under consideration. | <i>Limits of Use</i> |
| 9. | Where valves are specified and shown on the Drawings, refer WSA03-2011 Section 8 and SD311, SD312, and SD314. | <i>Valves</i> |

WATER SUPPLY

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| 10. | The Designer shall design thrust blocks to resist maximum pressure of the pipe, not the estimated surge pressure. Design for thrust and anchor blocks shall be included within design plans. | <i>Thrust Blocks</i> |
| 11. | The Designer shall provide for surge control by specifying an appropriate pipe material and class selection. | <i>Surge Control Method</i> |
| 12. | The Designer shall design bulkheads and trench stops, refer SD341. Design for bulkheads and trench stops shall be included within design plans. | <i>Bulkheads and Trench Stops</i> |

D11.11 DUCTILE IRON (DI) PIPE AND FITTINGS

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| 1. | Ductile iron pipes and fittings shall be specified to be manufactured in accordance with AS/NZS 2280 minimum Class PN20 DICL for rubber ring (elastomeric) joints. Where pipes are to be flanged, Flange Class pipe shall be specified. (WSA 03 Part 3, section 3) | <i>Standard</i> |
| 2. | The Designer shall specify cement mortar lining in accordance with AS 1281, or fusion-bonded medium density polyethylene to AS/NZS 4321. External protection shall be epoxy coating to AS 3862 where not otherwise specified as sleeved or wrapped, taking into account the type of corrosion protection required. | <i>Corrosion Protection</i> |
| 3. | Generally, pipe and fitting joints shall be specified to be spigot and socket type using a rubber ring (elastomeric) push in seal made of natural rubber, ethylene propylene rubber or nitrile rubber with compounds complying with AS 1646. The seal shall be a single jointing component shaped to provide both groove lock and seal mechanisms. | <i>Joints</i> |
| 4. | The Designer shall take account of congested service corridors, poor soil conditions and the need for additional security for strategic mains with regard to the provision of restrained joints. | <i>Restrained Joints</i> |
| 5. | Flanges shall be specified to be manufactured in accordance with AS 4087 and AS 2129 Table C. The Designer shall specify bolts and nuts for flanged joints in accordance with AS 2129, galvanised in accordance with AS 1214, or stainless steel in accordance with AS 1449 as for pumps specified in the C401- Water Reticulation. | <i>Flanges</i> |

D11.12 DELETED

D11.13 DELETED

D11.14 DELETED

D11.15 MATERIALS FOR CUL DE SACS- POLYETHYLENE PIPE AND FITTINGS

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| 1. | Polyethylene pipe shall be PE 80B and specified to be manufactured in accordance with AS/NZS 4130 PN16 and designed to AS/NZS 2566.1. | <i>Standard</i> |
| 2. | Fittings shall comply with AS/NZS 4129 with compounds to AS/NZS 4131. | <i>Fittings</i> |
| 3. | Jointing shall be by butt thermal fusion or by electrofusion couplings, or with compression fittings. | <i>Fusion</i> |

D11.16 DELETED**D11.17 WATER METERS**

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| 1. | Application to Council is required for the installation of water meter and bulk water meters. | <i>Council to install water meters</i> |
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D11.18 STOP VALVES

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| 1. | Stop valves of DN100 to DN300 nominal size shall be "Tubemakers Series 500" or equivalent resilient seat gate valves manufactured in accordance with AS2638. Council approval shall be obtained for the use of equivalent stop valves. For larger diameters butterfly valves can be used. | <i>Standard</i> |
| 2. | Flanges shall comply with AS 4087 Figure B5. | <i>Flanges</i> |
| 3. | Stop valves shall be closed by rotating the spindle in a clockwise direction. | <i>Spindle Rotation</i> |
| 4. | Valves shall be operated by a removable key. | <i>Operation</i> |
| 5. | Stop valves shall be protected internally and externally with Fusion Bonded coating in accordance with AS 4158 or equivalent protection approved by Council. | <i>Corrosion Protection</i> |
| 6. | Metal seated solid wedges are acceptable for stop valves at DN 750 and above. Sealing of valves shall be by metal to metal contact at the machined contact faces. | |
| 7. | The interval between stop valves on Trunk Mains shall not exceed one kilometre. | <i>Trunk Mains</i> |

D11.19 NON-RETURN VALVES

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| 1. | Non-return valves shall be full-bodied swing flap type manufactured in accordance with AS3578. | <i>Standard</i> |
| 2. | Flanges shall comply with AS 4087 Figure B5. | <i>Flanges</i> |
| 3. | Non-return valves shall be protected internally and externally with Fusion Bonded coating in accordance with AS 4158 or equivalent protection approved by Council. | <i>Corrosion Protection</i> |

D11.20 SPRING HYDRANTS

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| 1. | Spring hydrant bodies shall be manufactured in accordance with AS/NZS 2544 or AS 3952. | <i>Standard</i> |
| 2. | Spring hydrants shall be protected internally and externally with Fusion Bonded coating in accordance with AS 4158 or equivalent protection approved by Council. | <i>Corrosion Protection</i> |

D11.21 PRESSURE REDUCING VALVES

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| 1. | Pressure reducing valves shall be Cal-Val style or an equivalent approved by Council. | <i>Type</i> |
| 2. | Pressure reducing valves shall be installed in accordance with the manufacturers written instructions. | <i>Installation</i> |

WATER SUPPLY

3. Pressure Reducing Valves shall be surveyed to confirm upstream and downstream levels. Levels are to be provided to Council for calibration and acceptance testing. **Survey Levels**

D11.22 SERVICE CONNECTIONS

1. Only one service connection per lot or per strata lot to allow individual metering. Multi density/integrated lots with four or more attached/detached dwellings or strata lots shall apply for a bulk water service at the road frontage. **Connection requirements**
2. Service connections to Trunk Main infrastructure and properties greater than 20 metres from a water main shall not be approved unless authorised by the Director. **Trunk Mains**
3. All house service connections shall be the READYTAP system type installed at the time of pipeline construction. Where main cocks are approved by TSC to be located under concrete structures, the designer shall include accessible cast insitu path boxes to each stop valve. **Readytap**
4. For the diameters larger than 200mm Surseal tapping saddle manufactured from gun metal including studs and nuts or ductile iron tapping saddle complete with main cock capped ferrule T.P.F.N.R. gunmetal (min working pressure 1.8Mpa) shall be used.

D11.23 GIBAULT JOINTS

1. Gibaults shall be long barrel and compatible for use with ductile iron pipe and PVC Series 1 (white) pipe and PVC Series 2 (blue) pipe. Sleeves shall be cement lined or epoxy coated. Flanges shall be fitted with insulation bushes and stainless steel threaded studs and nuts. **Gibaults**

PUMP STATIONS

D11.24 GENERAL

1. Pumping stations will be provided for proposed subdivisions/developments, that due to remoteness from the existing water supply system or high altitude, are unable to meet water supply design criteria without provision of booster pumping and/or local service reservoirs. **Warrant**
2. The Designer shall take into account site access, site maintenance and restoration, easement, power supply and working area when locating pump stations. Pumping stations should be located within Council owned land or reserves. **Location**
3. Pump units shall be secured under a purpose-designed building which shall be subject to the Development Approval (DA) of the Council. The building shall match the aesthetics of the surrounding land use and shall accommodate any need for climate and/or acoustic control. Occupational Health and Safety requirements shall be met especially with regard to clearance for maintenance, and avoidance of trip hazards. **Pump Building**
4. Where pumps are to be installed below ground level, the Designer shall provide for the pumps to be mounted on plinths and housed in a single pump well. **Substructure**
5. The Designer shall provide for the construction of the pump well after taking into consideration the ground and site conditions. **Conditions**
6. Preformed components or systems, complying with the Drawings, if any, may be used in lieu of in-situ construction provided: **Preformed Components**

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| (a) | Preformed concrete wall units are to be manufactured to AS 4058. The Designer shall take into account the cover requirements for the reinforcing steel. | |
| (b) | Joints shall be internal flush | |
| (c) | The Designer shall ensure components make a watertight system and have a satisfactory surface finish. | |
| 7. | Where the pump station site is exposed to possible flooding, the Designer shall provide for the floor of the pump station or top of pump well, as appropriate, to be 0.3 metre above the 1 in 100 year flood level or to such other level as provided by Council's planning instruments, whichever is the higher. | <i>Protection Against Flooding</i> |
| 8. | The Designer shall provide for the design of pump wells against flotation both during the construction/installation stage and whilst operating under flood conditions designed as above. | <i>Protection Against Flotation</i> |
| 9. | Capacities of the pump unit shall be calculated from the intersection of the pump performance curve and the pipeline characteristic curve calculated at mid water level of the service reservoir involved with this duty point. The pump station shall deliver the required transfer capacity over a period of 22 hours. Standby pumping capacity shall be provided such that if one (1) pump is out of service, the pump station will remain able to supply the required transfer capacity. The pump unit shall be capable of operating near optimal efficiency within the range of operating conditions. | <i>Pump Capacity</i> |
| 10. | All pipework and fittings shall be in accordance with this Specification. In addition, all steel bolts, nuts and washers shall comply with AS/NZS 1111 and AS/NZS 1112 and shall be stainless steel complying with AS 1449 grade 316. | <i>Pump Pipework</i> |
| 11. | Where there is negative suction head at the pump inlet, provision shall be made to facilitate priming of each pump. | <i>Pump Prime</i> |
| 12. | The Designer shall provide for alarms and signals systems with the concurrence of TSC. | <i>Alarms and Signals</i> |
| 13. | Pump stations shall have a flow meter installed on the outlet downstream of manifold. Flow meters shall be factory calibrated by the supplier and the calibration test results shall be provided to Council to enable recalibration of the meter in future if necessary. | <i>Flow Meters</i> |

D11.25 PUMP

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| 1. | Pumps shall comply with the TSC Mechanical and Electrical Specifications. The Designer shall take account of dismantling joints and valves provided in the pipework to facilitate removal of the pumps for maintenance and the need for surge control devices. | <i>Pump Type</i> |
| 2. | Pump sets are to be interchangeable within each pump station where standby pumps are installed. | <i>Inter-Changeable</i> |
| 3. | The Designer shall design structural steelwork in accordance with HB 48. | <i>Structural Steelwork</i> |

D11.26 ELECTRICAL

1. Notwithstanding other clauses mentioned herein, the Designer shall be responsible for the design of the equipment as suitable for the purpose. Equipment design shall comply with the requirements of the relevant standard specification. **Design Responsibility**
2. The Designer shall provide for Switchgear Control Assembly (SCA), SCA housing and electrical requirements as detailed in the C401- Water Reticulation **SCA and Electrical**
3. Where more than one (1) item of equipment is designed to form a particular function, all such items of equipment shall be identical and completely interchangeable (eg pilot lights, pushbuttons, relays, etc). **Inter-changeability**
4. The switchboard shall be installed visibly and physically accessible above all areas at risk of flooding. **Switchboard**
5. Ambient conditions shall be within the normally accepted limits of 0°C to 45°C. **Ambient Conditions**
6. The switchboard shall be connected to the local electricity supply system. **Connection to Local Supply**

Nominal system parameters:
 - (a) 415 volt, 3-phase, 4-wire, 50 Hz, solidly earthed neutral system.
 - (b) Prospective Fault Current: As specified by TSC.
7. The works shall be designed in accordance with and subject to the provisions of TSC Electrical Specifications EL01-EL19, except where modified by this Specification. **Standards**
8. The pump station shall be designed for fully automatic operation in the unmanned condition. On receipt of a low water level signal from the service reservoir (i.e. telemetry), the duty pump/s shall ramp up to full speed within 15 seconds. **Automatic Operation**
9. The "AUTO" mode shall be capable of being overridden by turning the starter selector switch to the "ON" position. Manual operation would normally be used in the event of failure of the telemetry system or for function testing. A warning label (R/W/R) advising selector switches to be left in the "AUTO" mode shall be fitted to the common control cover. **Manual operation**
10. Deleted

D11.27 ELECTRICAL POWER SUPPLY

1. The consumer electrical mains shall be run underground where possible and commence at the point of attachment on a steel consumers pole (if applicable) installed near the property boundary and run in conduit to the switchboard. **Consumer Mains**

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| 2. | The minimum size of the consumers mains shall be sized to satisfy the following requirements: | <i>Minimum Size</i> |
| (a) | Current carrying capacity to suit the maximum demand with an excess current carrying capacity of 30 per cent minimum. | |
| (b) | Be sized for a voltage drop less than 1.5 per cent of the maximum demand as calculated. | |
| (c) | Be single core PVC/PVC cables. XLPE insulated cable may also be used. | |
| (d) | Comply with the requirements of TSC. | |
| (e) | Pole termination method shall be determined in consultation with TSC. | |

D11.28 TELEMETRY

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| 1. | The Designer shall provide for telemetry requirements in accordance with the schedule supplied by Council. | <i>Schedule</i> |
| 2. | The telemetry system is to be compatible with the existing systems in use. | <i>Compatibility</i> |

D11.29 STAIRS AND LADDERS

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| 1. | Staircases are preferred over ladders. Fixed platforms, walkways, stairs and ladders shall comply with AS 1657 and applicable Occupational Health and Safety legislation. | <i>Standard</i> |
| 2. | If required, the Designer shall set intermediate landings in wells to achieve the minimum head room clearance. Wherever possible, the landing shall be located adjacent to fittings and machinery requiring maintenance. | <i>Ladder Landings</i> |
| 3. | Ladder cages shall not be used on ladders in pump station wells. | <i>Ladder Cages</i> |

D11.30 OTHER APPURTENANCES

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| 1. | The Designer shall provide for machinery lifting equipment including pump chains as necessary. | <i>Lifting Equipment</i> |
| 2. | The Designer shall provide pressure tapping and gauges for all valves, including isolation and non-return valves as detailed in the C401- Water Reticulation | <i>Gauges</i> |
| 3. | The Designer shall take account of the possibility of site flooding ingress and overflow, and Occupational Health and Safety requirements in providing for access and inspection covers. | <i>Covers</i> |

RESERVOIRS

D11.31 RESERVOIRS

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| 1. | Unless otherwise directed in this specification, reservoirs shall be designed in accordance with criteria in the NSW Public Works "Water Supply Investigation Manual, September 1986" | <i>Design Criteria</i> |
| 2. | Reservoirs are to be sized to provide a usable storage volume equal to one day's supply at ultimate daily demand. | <i>Sizing</i> |

WATER SUPPLY

3. Reservoirs are generally cylindrical and constructed of steel, reinforced concrete or prestressed concrete. Council will only accept designs that minimise lifetime ownership costs. **Shape, Materials**
4. The following appurtenant equipment is required **Appurtenances**
- (a) Combined inlet/outlet except where hydraulic considerations require separation
 - (b) Overflow sized to discharge maximum inlet flow
 - (c) Scour outlet for cleaning and maintenance purposes.
 - (d) Automatic inlet control
 - (e) Telemetry devices, compatible with Council's existing system for sending depth readings back to Council's central control.
 - (f) Access stairs/ladders/platforms with inbuilt systems to prevent unauthorised access
 - (g) Roof over entire reservoir, bird and vermin proofing
 - (h) Flow meter to be installed on outlet. Flow meter to be factory calibrated by the supplier and the calibration test results shall be provided to Council to enable recalibration of the meter in future if necessary.
5. Reservoirs sites and associated access from a public road shall be dedicated to Council. Accesses to reservoirs shall be 4m wide bitumen surface, with horizontal and vertical alignment appropriate for council maintenance vehicles. **Sites, Access**
6. Power supply shall be provided for telemetry and necessary inlet controls. **Power Supply**

DOCUMENTATION

D11.31 PLAN AND DRAWING REQUIREMENTS

1. At Development Application Stage a Water Management concept report including assumptions, calculations used in determining design demands and layout plans shall be provided. Other pertinent considerations including zone boundaries and staging of capacity information shall be submitted to TSC for approval. For small developments (ie: < 2000 square meters), Clauses D12.05.1 shall be submitted for approval provided as a minimum (see Development Design Specification D13 - Engineering Drawings (Subdivisions)). ***Development Application***

2. For large developments including subdivisions (ie: > 2000 square meters), at Development Application Stage the Water Management concept report shall include (where applicable) how capacity for future stages is incorporated and any upgrade works to either the existing or future system to enable the servicing of the development including the provision of a network analysis of the reticulation system detailing the pressure and velocity distribution. (Refer to Clause D12.05.4). (see Development Design Specification D13 - Engineering Drawings (Subdivisions)). ***Development Application***

3. At Construction Certificate Detailed Engineering plans plus (if applicable) reporting regarding any design details required prior to constructions certificate conditions (see Development Design Specification D13 - Engineering Drawings (Subdivisions)). ***Construction Certificate or S68 Applications.***