

DEVELOPMENT DESIGN SPECIFICATION

D11

WATER RETICULATION

AUS-SPEC appreciates the role of the NSW Water Directorate in comprehensively updating the design and construction specifications for water and sewer works.

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
<i>EXAMPLE</i> 1	<i>Provision for acceptance of nonconformance with deduction in Payment</i>	<i>XYZ.00</i>	<i>AP</i>	<i>KP</i>	<i>2/6/97</i>
0	Customisation for Hastings Council Local Government Area. Major amendments, changes not marked.	D11.01 to D11.29	OAM	HC	7/08/03
1	Relocation of Contents page to beginning of document. Updating of Aus-Spec Standard Drawing References.	All	AOM	HC	26/02/04
2	Numerous typographical amendments and minor corrections to correspond to C401 amendments	All	OAM	JNH	06/07/05
3	Numerous typographical amendments and minor corrections	All	OAM	JNH	1/10/08
4	Minor corrections by the addition of requirements for reclaimed (lilac) water mains	Many	OAM	JNH	15/04/09
5	Minor amendments in various locations including D11.24 and replacement of D11.29	Var D11.24 D11.29	OAM	JNH	23/06/09

SPECIFICATION D11 - WATER RETICULATION

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DEVELOPMENT DESIGN SPECIFICATION D11 WATER RETICULATION

GENERAL

D11.01 SCOPE

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| <p>1. The work to be executed under this Specification consists of the design of a public water reticulation system either as a stand-alone project or part of a development. Port Macquarie-Hastings Council standard drawings numbered between ASD 400 and to 499 form part of this specification.</p> | System |
| <p>2. This Specification contains procedures for the design of a water supply reticulation system. In general, the same standards are to be used for both potable and reclaimed water reticulation. Pump station design has been deleted for the time being.</p> | Elements |
| <p>3. The design of reticulation components shall comply with the Water Services Association of Australia's publication WATER RETICULATION CODE OF AUSTRALIA WSA 03 1999 unless specified otherwise herein and should be constructed in accordance with the AUS-SPEC DEVELOPMENT CONSTRUCTION SPECIFICATION - WATER RETICULATION C401.</p> | Compliance |
| <p>4. Where the Specification forms part of a contract attracting Government Grant funds, the Principal shall identify:</p> <p style="margin-left: 20px;">(a) Items which are not of the least cost option, that:</p> <p style="margin-left: 40px;">(i) Are intended to have a much longer design life than the normal asset service life detailed in the Asset Management Guidelines of the International Infrastructure Management Manual.</p> <p style="margin-left: 40px;">(ii) Do not meet the project objectives and the requirements of the various Authorities for the least Net Present Value (NPV) but may become the preferred option for construction.</p> <p style="margin-left: 20px;">(b) Particular equipment which is procured without relevant competition through tendering</p> <p style="margin-left: 20px;">(c) Duplication of equipment or unit processes in a system configuration</p> | Subsidised Schemes |

D11.02 OBJECTIVE

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| <p>1. The objective of a water supply system is to provide to the consumer a reticulated (either potable or dual potable/reclaimed) water supply to meet the demands imposed upon it by both the consumers and fire fighting requirements. Consumer requirements shall be met by providing a water main and providing an appropriate point of connection in each individual property.</p> | Water Supply |
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D11.03 REFERENCE AND SOURCE DOCUMENTS

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| <p>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.</p> | Documents |
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2. References to the WATER RETICULATION CODE OF AUSTRALIA WSA 03 1999 are made where there are parallel sections or equivalent clauses to those in this Specification. Where called up as part of this Specification, these references are identified by part and section numbers and enclosed in brackets thus (WSA Part, Section).

**Water
Reticulation
Code**

(a) Council Specifications

ASD 105 - Footway Service Allocations
C401 - Development Construction Specification Water Reticulation C401.

The Designer shall include the requirements of the DEVELOPMENT CONSTRUCTION SPECIFICATION - WATER RETICULATION C401.

(b) Australian Standards

References in this Specification or the Drawings to Australian Standards are noted by their prefix AS or AS/NZS. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, section 1.4, and Part 2)

**Australian
Standards**

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 and drainage applications
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 2032	- Code of Practice for the installation of uPVC pipe systems
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 2419	- Fire Hydrant Installations
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 3000	-	Electrical Installations (SAA Wiring Rules)
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 3600	-	Concrete Structures.
AS 3680	-	Polyethylene sleeveings for ductile iron pipelines
AS 3681	-	Guidelines for the application of polyethylene sleeving to ductile iron pipelines and fittings
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/NZS 4020	-	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 4441	-	Orientated PVC (PVC-O) pipes for pressure applications
AS/NZS 4765(Int)	-	Modified PVC (PVC-M) pipes for pressure applications
HB 48	-	Steel structures design handbook

(c) Other

- (i) 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 and preferred location for water reticulation pipes - Also refer ASD 105)
- (ii) NSW Department of Public Works and Services (DPWS)
MEW E101 - Electrical Services Minimum Requirements
PWD-WSIM - Water Supply Investigation Manual
PWD - Safety Guidelines for fixed ladders, stairways, platforms and walkways.
WS-SPEC - Technical Requirements (TRs) and Strategic products Specifications (WSAA)
- (iii) Water Services Association of Australia (WSAA)
WSA 03 1999 - Water Reticulation Code of Australia WSA 03 1999

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

(d) Standard Drawings

Drawings

Port Macquarie-Hastings Council Standard Drawings, where available, are part of this specification.

DESIGN CRITERIA

D11.04 GENERAL

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| <p>1. Except where specified otherwise, the division of responsibilities between Port Macquarie-Hastings Council and the Designer shall be in accordance with the WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, section 2). Designer qualifications shall be in accordance with DQS.06 (Chartered Professional Engineer)</p> | <p>Responsibility and Designer Qualifications</p> |
| <p>2. The Designer shall take into account the special requirements for dual water supplies where required by Port Macquarie-Hastings Council, including but not limited to, demand, size and location for each pipe system.</p> | <p>Dual Supplies</p> |
| <p>3. Giving consideration to maintenance and repair requirements the Designer shall take into account the location and type of valves required, the need for double air valves with integral isolating valve on reticulation mains, and scour points. (WSA 03 1999 Part 1, section 4.7 & 4.8).</p> | <p>Valve Type and Location</p> |

D11.05 RETICULATION PRESSURE

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| <p>1. Reticulation systems shall be designed to supply peak instantaneous demand by gravity while maintaining a minimum static head of 200 kPa (20m) for potable water supply and 150 kPa (15m) for reclaimed water supply. (WSA 03 1999 Part 1, section 2.4).</p> | <p>Minimum Static Head</p> |
| <p>2. Demand criteria for water supplies are as follows:</p> <ul style="list-style-type: none"> ○ Peak daily demand - 4,000 litres per tenement per day with appropriate allowances for parks, reserves, industries, institutions and visitors. ○ Peak Instantaneous Demand - In the absence of information from the Manager, Water Supply Services to the contrary, 0.15 litres per second per tenement. Appropriate allowances (as approved by Council's Manager, Water Supply Services) for all other consumers with a minimum of 0.15 litres per second for commercial and industrial lots and 0.10 litres per second for flats, units and town houses. The location of the demand is as important as its size. ○ Annual demand - assumed to be equivalent to 100 peak days. ○ Future demand - can be derived from demographic and economic forecasts, which take into account natural growth, economic development and employment in and out, immigration and tourism, as well as having supply constraints. ○ For all other demands refer to "PWD Guideline Values for Water Demands" which is Attachment 1 of Appendix A of the PWD WSIM (Water Supply Investigation Manual). ○ Notwithstanding the above, the maximum permissible head losses for reticulation pipework are to be 5 metres per 1,000 metres of pipeline (2 metres per 1000 metres for new pipe work) except where otherwise allowed at the discretion of the Council's Manager, Water Supply Services. | <p>Water Demand</p> |

NOTE: A tenement is regarded as a dwelling with an equivalent population of 4 persons.

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| <p>3. Under no circumstances shall the maximum operating pressure be able to equal or</p> | <p>Maximum</p> |
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- exceed the safe working pressure of the reticulation pipe material. The effect of water hammer is to be taken into account for the maximum operating pressure.
4. The desirable maximum operating pressure is 600 kPa. Zoning of the reticulation system by means of pressure reducing valves (PRV's) may be necessary to achieve these pressures across the development.
5. Water mains within a development site are to be designed to satisfy requirements for fire fighting in accordance with the Building Code of Australia and AS 3500.
6. For subdivisions larger than 40 lots and for very large developments, the Designer shall provide a network analysis of the reticulation system, using an industry-recognised program, detailing the pressure and head loss distribution after consultation with Port Macquarie-Hastings Council. Values of residual head and pipe flow throughout the distribution system are to be computed. The program will also simulate operation over a 24-hour period enabling checking of flow rates, available head and reservoir levels during the daily cycle. The active storage of the reservoir is to be assumed to be 2/3 depleted during periods of maximum demand.

Pressure**Desirable
Maximum
Pressure****Fire Fighting****Network
Analysis****D11.06 PIPELINE**

1. Trunk mains or lead-in mains directly supplying reticulation systems shall be designed as part of the reticulation system to carry peak instantaneous demands. The maximum permissible head losses for trunk pipework is to be 2 metres per 1,000 metres of pipeline, except where otherwise allowed at the discretion of the Council's Manager, Water Supply Services.
2. 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.
3. Reticulation mains shall be linked or looped to provide adequate interconnections between parts of the reticulation and to eliminate or minimise dead ends. Where dead ends are unavoidable, treatment is to be in accordance with Aus-Spec Standard Drawing **ASD 410**
4. Where a dead end is permitted to provide for future extension from staged development, the end shall be fitted with a stop valve (if required), a hydrant bend and hydrant. Water mains are to terminate at property boundaries (do not extend on to private property).
5. Wherever possible, the development shall be serviced from two or more trunk or distribution mains to avoid the loss of supply in the event of maintenance or breakage.
6. Each lot shall have an individual service tapped from the main and extending 300 to 750mm inside the lot boundary and generally be 400mm (potable) and 600mm (reclaimed) from the side boundary in accordance with Aus-Spec Standard Drawings **ASD450, ASD451** and **ASD452**.

Trunk Mains**Peak Daily
Demand****Looped Mains****Staged
Development****Loss of Supply****Individual
Service**

Each dwelling unit is to be separately metered with the meters being located on the road frontage, unless the domestic supply to the whole site is metered with a single larger meter, in which case the individual meters required for each lot need not be located on the road frontage. In the later case, a centralised electronic reading console with a master water meter at the property boundary will be required. Note that if there are separate outdoor water service requirements, then an additional water meter will be required for the body corporate areas.

Minimum 25mm water services are to be provided for Industrial and Commercial developments. Battle-axe lots with a driveway length greater than 30m will require a 20mm

water meter and service at the road frontage and a minimum 25mm copper water service (or equivalent) for the length of the access handle.

Services are to be laid in-ground wherever possible. Where this is not possible then conduits for watermain services shall be provided under roads and shall be 90 mm diameter UPVC pipe or similar.

Where there are potable and reclaimed water services, then they are to be laid with a minimum separation of 50mm, unless laid in a conduit.

Meters are not to be located behind fences over 1.2 metres in height. High fences on road frontages are to be recessed to permit access to water meters from the road.

Granny flats may be served off the existing 20mm house service. Should the flat no longer be used by a relative, then a second metered water service is to be provided or the existing water service upgraded to a 25mm by Council at the owner's cost.

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| <p>7. The Designer shall confirm with the Port Macquarie-Hastings Council if valves are to be housed in valve chambers. The Designer shall show on the Drawings the type of cover and how the covers shall be seated. Where not in a separate chamber, the design shall be to the WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999-Part 3) and ASD 440, ASD 441, ASD 442 & ASD 443.</p> | <p>Valve Chambers</p> |
| <p>8. Where valves are specified and shown on the Drawings, they shall be clockwise closing, resilient seated, manufactured to AS 2638, with a blue thermal bonded coating to AS 4158 (lilac coloured for reclaimed water) and comply with the valve details in the WATER RETICULATION CODE. OF AUSTRALIA (WSA 03 1999 Part 1, section 4.7.1 & 4.7.2 and ASD 441)</p> <p>Where hydrants are specified and shown on the Drawings, they shall be spring type, manufactured to AS 3952, with a blue thermal bonded coating to AS 4158 (lilac coloured for reclaimed water) and comply with the hydrant details in the WATER RETICULATION CODE. OF AUSTRALIA (WSA 03 1999 Part 1, section 4.7.3 and ASD 440)</p> | <p>Valves and Hydrants</p> |
| <p>9. The Designer shall design thrust blocks to resist maximum design pressure of the pipe ie the total of the maximum static pressure and the estimated surge pressure (refer ASD 432).</p> <p>Constrained joints may, with the consent of the Port Macquarie-Hastings Council's Manager Water Supply Services, be used in situations where thrust blocks are not practical or desirable. The constraint system is to be designed in accordance with the manufacturer's requirements and calculations and details submitted with the engineering plans.</p> | <p>Thrust Blocks</p> |
| <p>10. The Designer shall provide for ease of air valve maintenance, and select valve types such that servicing of the valve can be affected without removal from service, wherever possible.</p> | <p>Air Valve Maintenance</p> |
| <p>11. The Designer shall allow for adequate working area, drainage facilities, waste removal and transport arrangements where scouring points or pipe inspection locations are nominated. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, section 4.8)</p> | <p>Special Allowances</p> |
| <p>12. The Designer shall indicate the location of connections for gauges required on mains.</p> | <p>Gauge Locations</p> |
| <p>13. The Designer shall provide for surge control by specifying or showing on the plans, appropriate surge mitigation measures.</p> | <p>Surge Control Method</p> |

D11.07 LOCATION

1. In designing the reticulation system, standard locations shall be followed, as detailed below: **Standard Location**
- (a) Reticulation mains shall be laid in footpath areas in accordance with **ASD 401** and **ASD 402**, otherwise in compliance with Port Macquarie-Hastings Council's standard footpath allocation for public utilities (**ASD 105**), or in the absence thereof, in conformity with the Streets Opening Conferences' protocols. The normal minimum depth of cover is 600mm under roads, 450mm in footpaths and 600mm to 750mm elsewhere. Preferred maximum depth of cover is 900mm and preferred maximum depth to invert is 1,400mm. Where there are potable and reclaimed water mains in the same trench and one water main is larger than the other, then additional bedding is to be provided for the smaller main so that the centres of the pipes are at the same level. Where it is necessary for potable and reclaimed water mains to be at different levels (for example: where tee junctions are required) then the reclaimed water main, where practical, is to be the lower of the two.
 - (b) Where it is necessary to lay water mains in carriageways, then the pipes are to be in ductile iron and laid in accordance with standard drawing **ASD 405** along carriageways or across carriageways at 90 degrees to the road centreline. Where a pipe size change is required at an intersection, then the larger pipe size is to be carried under the road pavement and the taper and any bends required are to be located in the footpath area.
 - (c) Valves shall be located in footpath areas and avoid conflict with driveways, water service tapping points, telephone house service pits and underground electrical boxes. Stop valves shall be located so that 20 to 40 dwellings can be isolated for shutdowns. (Refer **ASD 441**)
 - (d) Hydrants shall be located in footpath areas below ground on all reticulation mains at all high and low points of the main, and at dead ends. The interval between hydrants in urban areas shall not exceed 60 metres for potable water mains and 180 metres for reclaimed water mains. In rural residential areas, hydrants are to be located to provide a fire service cover to each building envelope, in accordance with AS 2419 and **ASD 440**
 - (e) For water mains not able to be located in the standard location one metre behind the kerb or where a water main adjoins a property boundary away from a kerb, an offset to the boundary of 2.5 metres will normally be required. A minimum property boundary offset of 2.5 metres will also apply where it is necessary to cut a corner on the footpath area at an intersection.

Offsets to kerb and property boundaries are to be based on the potable water main being in the standard position. Where there are water mains of either type larger than 150mm or non-standard footpath widths then individual advice as to offsets will be provided by the Manager, Water Supply Services.
 - (f) Where reclaimed and potable water mains are laid side by side, a 300mm

separation (clear distance) will be required for water main sizes under 300mm diameter. A 500mm separation will be required where one or both water mains are 300mm or more. Where a second water main is laid at a later date then the minimum separation between water mains is to be one meter. Reclaimed water mains will usually be located closer to the property boundary.

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| <p>2. Acute angle water main crossings refer to any utility crossing over or under a water main with an intersection angle less than 45°. The acute angle crossing should not be an issue if all of the footway service allocations are complied with. The footway service allocations are shown in Standard Drawing ASD 105.</p> | <p>Acute angle water main crossings</p> |
| <p>3. Acute angle crossings will not be permitted</p> <ul style="list-style-type: none"> • Under road pavements. • Where the water main is deeper than a stormwater pipe or other utility service. | <p>Acute angle crossings not permitted</p> |
| <p>4. Alternatives to acute angle crossings for stormwater pipes</p> <ul style="list-style-type: none"> • Stormwater pipes can be laid on curves to follow the kerb radius with a lower radius limit in accordance with manufacturer's recommendations. • Manufacturers are able to supply stormwater pipes with additional collar length, specifically designed for curved pipelines. These have an even lower radius limit than standard stormwater pipes. • Provide additional turning junction or kerb inlet pits. | <p>Alternatives to acute angle crossings</p> |
| <p>5. Where acute angle crossings of stormwater pipes are permitted.</p> <ul style="list-style-type: none"> • Stormwater trench sand embedment material is to be carried up to 150mm over the top of the water main. • All trench filling (sand embedment material) below the water main is to be compacted to road trench standards. • The minimum vertical clearance between the water main and the stormwater pipe is not to be less than 150mm wherever the water main is within one stormwater pipe diameter of the stormwater pipe edge. | <p>Where acute angle crossings are permitted</p> |
| <p>6. Locating of water mains on private property is to be avoided, however, where it is necessary, they are to be located in an easement in favour of Port Macquarie-Hastings Council and be of minimum width five (5) metres. 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 certify the location of pipelines within the easements.</p> | <p>Private property</p> |
| <p>7. Location of water services in easements other than access related easement for the property being served will not be permitted.</p> | <p>Waters services in easements</p> |

D11.08 MINE SUBSIDENCE AREAS AND AREAS OF SLIPPAGE

1. The Designer shall make provision in water reticulation joining systems to accommodate the movement associated with ground strain in areas proclaimed by the Mine Subsidence Board as Mine Subsidence Areas, or in a known or expected area of subsidence or slippage. The design measures to be taken shall be detailed on the Drawings. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, section 4.3.3.3)
2. The pipe jointing system selected shall be capable of accepting ground movements, without impairing the water tightness of the joint, for the ground strain as advised by the Mine Subsidence Board. For areas with high ground strains a pipe jointing system using shorter effective length pipes and/or deep socket fittings shall be used. This action constitutes a **WITNESS POINT**. The Principal shall advise at the time of notification by the Designer whether the option to confer is required.
3. Where the Mines Subsidence Board does not cover an area of known, or suspected, subsidence or slippage, the above requirements shall still apply.

Ground Strain**Pipe Jointing
System****WP****Areas
Applicable**

MATERIALS

D11.09 GENERAL (WSA 03 1999 Part 2)

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| 1. 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 1,200 kPa (120m) for all areas except Transit Hill Reservoir zone where the working pressure shall be 1,600 kPa (160m). | Working Pressure |
| 2. The Designer shall select a reticulation pipeline system based on relevant standards and a fitness for purpose to perform under normal operating conditions. All pipes shall be a minimum Class 12 (Class 16 in Transit Hill Reservoir zone) unless otherwise determined by Port Macquarie-Hastings Council. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, sections 2.3.2, 2.3.3.1, 2.3.3.2, 3.7.2.1, and 3.7.2.2, Part 2). | Class and Standard |
| 3. Pipes for water reticulation shall be of unplasticised PVC, modified PVC, orientated PVC, ductile iron, polyethylene (limited use), or copper. Fittings for water reticulation shall be either cement lined or internally FBE coated and externally FBE coated ductile iron. The material specifications for each pipe type are provided in clauses D11.10 to D11.16 inclusive. | Type |
| 4. 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 on the plans and shown on the Drawings accordingly. | Colour Coding |
| 5. 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 the WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1 section 4.11). Green (or blue) detector tape shall be laid with all potable water reticulation pipes and all water services where non-standard locations are permitted. Lilac coloured detector tape is to be used for reclaimed water mains. Testing for aggressive ground conditions may need to be undertaken before selection of pipeline material. | External Protection |
| 6. Piers for any above ground water main shall be in accordance with the WATER RETICULATION CODE OF AUSTRALIA and ASD 423 | Piers |
| 7. The minimum diameter of all pipes shall be DN 100, unless otherwise determined by the Manager, Water Supply Services. In commercial, industrial, special use, open space or high-rise building areas the minimum shall be DN 150 for potable water and DN 100 for reclaimed water. In all cases pipe sizes shall be designed to provide specified flow rates and residual pressures including those required for fire fighting. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 1, sections 2.3.1.1 and 3.7.3.1) | Diameter |
| 8. The Designer shall take regard of the limits of use for the pipeline system materials under consideration. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 2, sections 2.5, 3.6, 4.6, 5.6, 6.6, and 7.6) | Limits of Use |
| 9. Access covers shall be made of polyethylene or recycled plastic as indicated on ASD 440, ASD 441, ASD 442 and ASD 443 . Metal access covers, where permitted, shall be manufactured in accordance with AS 3996. The Designer shall ensure that air valve covers have adequate openings for air exchange. | Access Covers |

D11.10 UNPLASTICISED MODIFIED AND ORIENTATED PVC (PVC-U PVC-M and PVC-O) PIPE

- | | |
|---|----------------------|
| 1. Unplasticized PVC (PVC-U) pipe, minimum class 12, shall be specified to be manufactured in accordance with AS/NZS 4020, AS/NZS 1477 Series 2, with rubber ring (elastomeric) spigot and socket joints. Modified PVC (PVC-M) pipes shall be specified to be manufactured in accordance with AS/NZS 4020, AS/NZS 4765, with rubber ring (elastomeric) spigot and socket joints. Orientated PVC (PVC-O) pipes shall be specified to be manufactured in accordance with AS/NZS 4020, AS/NZS 4441, with rubber ring (elastomeric) spigot and socket joints. Potable water mains are to be blue in colour and reclaimed water mains are to be lilac in colour. (WATER RETICULATION CODE OF AUSTRALIA WSA 03 1999 Part 2, section 7). | Standard |
| 2. (This clause is not required as uPVC pipe is required to be to AS 1477 Series 2) | DI Compatible |
| 3. PVC pipes shall be pre-curved to suit the radius of any cul-de-sac road pavement in which they are to be installed. An alternative cul-de-sac arrangement with ductile iron fittings may be used as shown on ASD 410 . Full details of curved pipes and/or fittings are to be shown on the engineering plans. | Pre-curved |
| 4. Ductile iron fittings only are to be used with PVC pipe and shall be elastomeric seal jointed. | Fittings |

D11.11 ACRYLONITRILE BUTADIENE STYRENE (ABS) PIPE AND FITTINGS

Are not approved for general use.

Standard

D11.12 DUCTILE IRON (DI) PIPE AND FITTINGS

- | | |
|---|-----------------------------|
| 1. Ductile iron pipes and fittings shall be specified to be manufactured in accordance with AS/NZS 2280 minimum PN 35 or Class K9 for rubber ring (elastomeric) joints. Where pipes are to be flanged, Class K12 shall be specified. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 2, section 3) | Standard |
| 2. For pipes, 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 a thermal bonded coating to AS 4158 where not otherwise specified as sleeved or wrapped, taking into account the type of corrosion protection required. Blue or green coloured sleeving is to be used for potable water mains and lilac coloured sleeving is to be used for reclaimed water mains.

Fittings shall have a thermal bonded internal and external coating to AS 4158 | Corrosion Protection |
| 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. | Joints |
| 4. The Designer shall take into account the provision of restrained joints in congested service corridors, and where poor soil conditions exist. Details on the means of identification and the length of pipeline restrained are to be shown on design drawings. | Restrained Joints |
| 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. | Flanges |

D11.13 STEEL PIPE AND FITTINGS

Are not approved for general use.

D11.14 POLYETHYLENE PIPE AND FITTINGS

- | | |
|--|-----------------|
| 1. Polyethylene pipe will no longer be permitted for use in water services between the water main and water meter or for water mains around cul-de-sacs, unless specifically approved by the Manager, Water Supply Services. The use as an encasement shield is still acceptable as is its use as water main where installation by boring. | Standard |
| 2. Polyethylene pipe shall be material type PE80B, pressure class PN16, blue stripe black pipe manufactured in accordance with AS/NZS 4130 and designed to AS/NZS 2566.1. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 2, section 6) | Standard |
| 3. Electrofusion jointing methods only will be permitted. | |
| 4. Polyethylene pipe fittings shall be blue or black electrofusion type and comply with AS/NZS 4129. | Fittings |

D11.15 GLASS REINFORCED PLASTIC (GRP) AND FITTINGS

Are not approved for general use.

D11.16 COPPER PIPE AND FITTINGS– UP TO DN 50 ONLY

- | | |
|---|-----------------|
| 1. Copper tube shall be specified to be manufactured in accordance with AS 1432 in the range of DN 6 20 to DN200 for Type A or Type B. WATER RETICULATION CODE OF AUSTRALIA (WSA 03 1999 Part 2, section 2). A bonded lilac coloured coating is required for copper reclaimed water service pipes | Standard |
| 2. Capillary fittings shall be specified to comply with AS 3688 and de-zincification resistant. Capillary fittings shall have silver brazed joints. Soft solder joints and compression fittings are not permitted | Fittings |

PUMP STATIONS

D11.17 RESERVED

D11.18 RESERVED

D11.19 RESERVED

D11.20 RESERVED

D11.21 RESERVED

D11.22 RESERVED

D11.23 RESERVED

DOCUMENTATION

D11.24 RETICULATION

1. The Principal shall submit, to Port Macquarie-Hastings Council for approval, four (4) copies of the proposed water main design, including calculations and network analysis, if appropriate, prior to commencement of construction. (WSA 03 1999 Part 1, section 5) This action constitutes a **WITNESS POINT**.

Review

WP

Plans resubmitted after initial assessment by Port Macquarie-Hastings Council are to be accompanied by a report, cross referenced to assessment item numbers and detailing the alterations made. Alterations to other infrastructure items such as road, stormwater and sewer levels that may affect water supply infrastructure design are also to be detailed.

All sheets of the plans are to have the development application number shown; have an amendment box indicating all amendments and dates; and also have a sheet numbering system distinguishing the various amendment issues.

2. The Drawings shall show to scale:

(a) Plan showing:

Plan

- (1) Lot boundaries and lot numbers
- (2) Location and size, type, class, distance from kerb or road alignment of all mains, appurtenances and pump stations
- (3) Existing mains
- (4) Existing and proposed features and services
- (5) North point and scale bar
- (6) Level datum
- (7) Easement locations
- (8) Arrangement of other utilities.

(b) Longitudinal section showing:

**Longitudinal
Section**

Note that a water main longitudinal section will not normally required where the water main is on a road design plan (complete with longitudinal section and cross sections), provided that the water main is generally parallel with the road centreline and is shown on all cross sections, sewer and stormwater longitudinal sections and at any point where the cover and/or clearance requirements are at or below the limit, a detail clearly indicating covers and clearances is submitted for consideration by Council's Manager, Water Supply Services.

- (1) Reduced levels for natural surface and design surfaces at all changes in grade and at intervals not exceeding 15 metres.
- (2) Mains, appurtenances and pump stations

- (3) Appurtenances numbered in accordance with Port Macquarie-Hastings Council's Asset Register
- (4) Invert levels where necessary
- (5) Size, type, class and grade of pipe
- (6) Location, invert level and size of all drainage lines, sewer mains, and other utility services crossing the main
- (7) Notation regarding all joining lines
- (8) Property ownership
- (9) Note "In road" trench conditions

(c) Cross sections showing:

Cross Sections

Note that a water main cross sections will not normally required where the water main is on a road design plan (complete with longitudinal section and cross sections), provided that the water main is generally parallel with the road centreline and is shown on all cross sections, sewer and stormwater longitudinal sections.

- (1) The location of the water main
- (2) Reduced levels for natural surface and design surfaces at all changes in grade and at intervals not exceeding 15 metres.
- (3) Location, invert level and size of all drainage lines, sewer mains, and other utility services crossing the main
- (4) Invert levels where necessary
- (5) At any point where the cover and/or clearance requirements are at or below the limit, a detail clearly indicating covers and clearances is submitted for consideration by Council's Manager, Water Supply Services.

- (d) General arrangement of pump stations with site plan; concrete outlines; number, make, model and details of pumps; inlet and outlet pipework details and levels; pump cut in; cut out and alarm levels; switchboard location; pump station access details; design starts per hour.

Pump Stations

- (e) Details of corrosion protection required for pipes and fittings.

Pipe Protection

- (f) Areas designated for trenchless pipe installation.

Trenchless Installation

3. Detail plans shall be drawn to a scale of 1:500 and longitudinal sections to a horizontal scale of 1:1000 and a vertical scale of 1:100. The Designer shall show locations of hydrants, stop valves, non-return valves, air valves and scour valves, tees, bends, tapers, creek crossings, trench dimensions and backfill, thrust blocks, and other existing and proposed services and installations including chambers and covers and items of construction which are project specific.

Drawing Scale

-
- | | |
|--|------------------------|
| 4. Drawings shall be 'A3' and/or 'A1' size after consultation with Port Macquarie-Hastings Council. | Drawing Size |
| 5. Drawings shall also be provided in electronic form after consultation with Port Macquarie-Hastings Council. | Electronic Form |

D11.25 PUMP STATION

1. Pump station documentation to be provided in accordance with Port Macquarie-Hastings Council requirements

D11.26 ASSET REGISTER

- | | |
|---|--------------------|
| 1. The Designer shall provide asset schedules and Drawings in a form consistent with the existing or proposed Asset Register after consultation with Port Macquarie-Hastings Council. (WSA 03 1999 Part 1, section 5.6) | Consistency |
|---|--------------------|

SPECIAL REQUIREMENTS

D11.27 MARKERS

1. Markers are to be installed in accordance with Aus-Spec standard drawings **ASD 460, ASD 461** and **ASD 462**

D11.28 SERVICE LOCATIONS

1. Water services are to be installed in accordance with Aus-Spec standard drawings **ASD 450, ASD 451** and **ASD 452**.
2. Footpath boxes are to be installed over all water service valves, where any paving is being installed.

D11.29 PRIVATE WATER RETICULATION SYSTEMS

The plans for private water reticulation systems are referred to as 'Hydraulic Plans' as distinct from 'Engineering Plans' which are for new reticulated water mains that will be come the property of Council and be located in public roads, public reserves, water supply reserves or in some cases easements for water supply in favour of Council.

Preliminaries

Each sheet of the plans is to be signed and certified for compliance with AS3500 and related standards by a Chartered Professional Engineer with appropriate building hydraulics experience. The signature box is also to have the designers name and qualifications clearly printed.

Note that Council carries out no formal checking on the proposed internal work. Issues will be raised for non-compliance with AS 3500 where noticed or where, for example, the water meter is obviously undersized.

For proposals involving water main construction that will become the property of Council, refer to D11.24 for plan details.

Final approval of the plans and issue of appropriate certificates will rest with Council's Development and Environment division after acceptance of the plans by Council's Water Supply Section.

1. The Principal shall submit, to Port Macquarie-Hastings Council for approval, three (3) copies of the proposed water service design within the development site, including calculations and any network analysis, prior to or in conjunction with an application for a Section 68 (Local Government act 1993) or construction certificate.

Review

Plans resubmitted after initial assessment by Port Macquarie-Hastings Council's Water Supply Section are to be accompanied by a report, cross referenced to assessment item numbers and detailing the alterations made. Alterations to other infrastructure items such as road, stormwater and sewer levels that may affect water supply infrastructure design are also to be detailed.

All sheets of the plans are to have the development application number shown either in a separate box or included in the plan title; have an amendment box indicating all

amendments and dates; and also have a sheet numbering system distinguishing the various amendment issues.

2. The Drawings shall show at a scale of 1:100 or larger unless otherwise approved by the Manager, Water Supply Services:

- (a) Plan showing: **Plan**
- (1) Lot boundaries, lot numbers, street numbers, road names
 - (2) Location and size, type, class, distance from kerb or road alignment of all existing and proposed mains, appurtenances (stop valves and hydrants etc.) and pump stations adjoining the development site
 - (3) Cross reference to water notes if not on the same sheet
 - (4) Existing and proposed features and services
 - (5) North point and scale bar
 - (6) Level datum
 - (7) Easement locations
 - (8) Arrangement of other utilities.
- (b) Additional plans and diagrams showing: **Additional Diagrams**
- (1) Critical clearances to structures and utilities
 - (2) An isometric diagram of proposed internal water service pipes for multi storey developments showing location, size, type, class, distance from kerb or road alignment of all existing and proposed mains, appurtenances (stop valves and hydrants etc.) and pump stations adjoining the development site
 - (3) Diagrams for each proposed meter installation. This can also be in isometric stick figure form and providing the relevant information detailed in the meter section below
- (c) Metering requirements: **Meters**
- (1) Council will carry out the water main service tapping and work external to the site as well as the internal meter installation at the applicant's expense
 - (2) Show proposed road connection point, stop valve, tee and size etc.
 - (3) Show proposed domestic water meter and size, gate valves, DCV and stop cocks before and after etc.
 - (4) Provide a single detector check on the fire service as well as a gate valve on both sides (double detector check if within 150 metres of an alternative surface water supply)
 - (5) Provide a separate single detector check on sprinkler service as well as a gate valve on both sides
 - (6) Show any required testable back flow prevention devices (register

maintained by Water Supply Section). An additional gate valve is required between the meter and an RPZ device

- (7) A single water service will usually be provided for example a 150mm pipe, tee and stop valve instead of two 100mm services. Domestic metering may be tapped off the fire service near the meter subject to designer's approval
- (8) Plans or diagrams are to show limit of Council/contractor work. Clearly indicate the work to be carried out by Council at the applicant's expense and that to be carried out by others. For the domestic service, the meter will be supplied by Council at the applicant's expense and be of a type currently approved by Council. The limit of the work to be carried out by Council is the valve after the metering and backflow protection device
- (9) Check meter size for adequacy
- (10) Hot water meters are required for communal hot water systems in residential developments
- (11) Where there is mixed residential and commercial development there is to be totally separate water metering between the residential and commercial components
- (12) The upsizing of water meters simply to get a higher allocation threshold will not be permitted
- (13) Disconnection of existing water services across boundaries in new subdivisions will not be required
- (14) Meters are not to be located behind fences over 1.2 metres in height. High fences on road frontages are to be recessed to permit access to water meters from the road

(d) Each dwelling unit is to be separately metered with the meters being located on the road frontage, unless the domestic supply to the whole site is metered with a single larger meter, in which case the individual meters required for each lot need not be located on the road frontage. In the latter case, a centralised electronic reading console and with a master water meter at the property boundary will be required. Note that if there are separate outdoor water service requirements, then an additional water meter will be required for the body corporate areas

Dwellings

(e) Water meter sizes: 25, 32, 40, 50, 80 100 & 150. 20mm only available for single domestic dwellings. Single dwellings on battleaxe lots with a driveway length greater than 30m will require a 20mm water meter and service at the road frontage and a minimum 25mm copper water service (or equivalent) for the length of the access handle.

Meter sizes

3. Additional fire service matters:

Fire Services

- (1) Fire hose reels are to be on the domestic water service, not on the fire service
- (2) Window and wall drenchers are to be either separately metered or supplied from the domestic water meter

- (3) Additional backflow protection will be required where fire hose reels (for example) are near sewer pump-out wells
- (4) Full metering of the fire service will be required by the Manager, Water Supply Services where there is a booster system that required regular testing. In such cases, consideration should be given to the collection and appropriate reuse of the water used in the testing.
- (5) Generally, Council's water mains will only be located on public road, pathway or public or water supply reserves. A property owner will normally be required to install a private water hydrant (or hydrants) wherever an existing or proposed development is out of reach of a street hydrant on Council's water supply reticulation. Where fire service coverage from a fire hydrant to AS 2419 is not practical either a private fire service or a tank storage alternative acceptable to Council's Development and Environmental Division, NSW Fire Brigades and NSW Rural Fire Service will be required
- (6) All proposed fire services need to be submitted to Council after they have been certified by a suitably qualified hydraulic consultant and either the NSW Fire Brigades or NSW Rural Fire Service as relevant
- (7) Where a property owner is to install private water hydrants, they are the responsibility of the owner. Where underground hydrants are to be installed, they shall be spring type, manufactured to AS 3952, with an approved thermal-bonded coating to AS 4158 and installed in accordance with AS 2419. Private fire hydrants must be located on land fully under the control of the property owner, who will be responsible for all water charges (not in an easement of any form).
4. Full details of any alternative, recycled or rainwater systems proposed within the development are to be provided with the hydraulic plans. **Alternative supplies**
5. Drawings shall be 'A1' size with a single 'A3' set. The nature of the plan may dictate that an alternative presentation form may be more suitable, in this case consultation with Port Macquarie-Hastings Council is advised. **Drawing Size**
6. Drawings shall also be provided in electronic form after consultation with Port Macquarie-Hastings Council. **Electronic Form**
7. All testable devices are to be registered with Council and a statement to this effect is to be included on the plans. The plans and diagrams are to show the location of each and a table showing the individual devices with location description is to be provided. **Testable devices**
8. The aesthetics of large fire service and booster systems is to be drawn to the architect's attention. **Aesthetics**