NEW SOUTH WALES

DEVELOPMENT DESIGN SPECIFICATION

D11

WATER SUPPLY

VERSION 3.0

SPECIFICATION D11 – WATER SUPPLY

CLAUSE **CONTENTS** **PAGE**

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 tolic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
DRAFT	Major revision for use in Northern Rivers Local Government Manuals	All	AMOP	GAK	13/3/2009
VERSION 3.0	Minor changes to DRAFT following consultation with Councils	Various	AMO	GAK	15/5/2009

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

   The developer is to provide a water supply system, sourced from Council's preferred connection point, that will deliver design peak instantaneous demand (PID) at a minimum 20m head to each allotment, unless otherwise specified by Council.

   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 PID may 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 WSA 03 - WATER SUPPLY CODE OF AUSTRALIA unless specified otherwise herein and should be constructed in accordance with the C401 – Water Reticulation (WSA 03 - WATER SUPPLY CODE OF AUSTRALIA, PART 4 CONSTRUCTION). ***Compliance***

4. A reticulated water supply system designed in accordance with this specification is to be provided for

   (a) All urban and rural subdivision allotments to be serviced by reticulated water supply.

   (b) Urban parks, reserves, public open spaces

   (c) Sewerage pumping stations, public toilets and change rooms

   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 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. ***Water Supply***

D11.03 REFERENCE AND SOURCE DOCUMENTS

Whilst this document has been developed to provide consistency across the Northern Rivers Region including Ballina Shire Council, Byron Shire Council, Clarence Valley Council, Kyogle Council, Lismore City Council and Richmond Valley Council, individual Councils may still have current policies which may conflict with or contradict this specification. In cases of conflict or contradiction, unless otherwise specified, the provisions of the adopted individual Council policies will prevail until such time as they are superseded or revoked.

The Designer will consult with the individual Council/s and ensure any individual Council policies are taken into consideration. The Designer shall use the latest edition of any referenced document including amendments and supplements, unless specified otherwise in this Specification.

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. ***Documents***

2. References to the WSA 03 - 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 Part, Section). ***Water Reticulation Code***

(a) Council Specifications

Northern Rivers Local Government Development and Design Manual

Northern Rivers Local Government Construction Manual

Northern Rivers Local Government Standard Drawings

(b) Australian Standards

References in this Specification or the Drawings to Australian Standards are noted by their prefix AS or AS/NZS. (WSA 03 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 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 Butadienne Styrene (ABS) pipes and fittings for pressure applications – Pipes
AS 3518.2	-	Acrylonitrile Butadienne 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 sleevings 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	-	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

(c) Other

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)

Water Services Association of Australia (WSAA)
WSA 03 - WATER SUPPLY CODE OF AUSTRALIA

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

(d) Standard Drawings that apply to this section: ***Drawings***

It is intended to develop a series of standard drawings for inclusion in the Northern Rivers Local Government Standard Drawings relating to water supply and sewerage systems. When these are developed, these drawings will be used in preference to other standard drawings. Where there is not a suitable standard drawing included in the Northern Rivers Local Government Standard Drawings, Council will consider use of other standard drawings.

Other standard drawings may be used, subject to assessment by the individual Council. Where proposed to use other standard drawings, such as those listed below, copies are to be provided with each set of design drawings to allow the use of the standard drawing to be assessed by the individual Council.

- Tweed Shire Council Standard Drawings
- WSA 03 - WATER SUPPLY CODE OF AUSTRALIA standard drawings
- IPWEA Standard Drawings

DESIGN CRITERIA

D11.04 GENERAL

1. Water supply system design criteria shall be in accordance with WSA 03 - WATER SUPPLY CODE OF AUSTRALIA, Part 1, unless directed otherwise by this specification. ***WSA - 03 -1999 Part 1***

2. WSA 03 - WATER SUPPLY CODE OF AUSTRALIA, Part 1, section 2.1, *Design Responsibilities* is to be ignored. The design responsibilities shall be:- ***Responsibility, Council and developer's/ developer's designer***

   Council will provide:

   (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 allow access to its trunk water supply system computer model

   The Developer/Designer's responsibilities shall be:

   (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 subdivision

(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; 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.

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. ***Valve Type and Location***

D11.05 RETICULATION PRESSURE

1. Reticulation systems shall be designed to supply peak instantaneous demand by gravity while maintaining a minimum pressure of 200 kPa (20m). (WSA 03 Part 1, section 2.4). ***Minimum Pressure***

2. A peak instantaneous demand of 0.15 L/s/tenement shall be used except that when supplying more than 1000 tenements, a demand of 0.10 L/s/tenement shall be used. ***Water Demand***

   Water demands for other industries shall be as detailed in the C401 – Water Reticulation (WSA 03 Part 1, section 3)

3. 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***

4. 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***

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

   Fire fighting pressure shall be 118 kPa at the building pad under fire fighting flow at 11 l/s for office buildings and common residential buildings not exceeding 25m in height.

6. The Designer shall provide a network analysis of the reticulation system detailing the pressure and velocity distribution if required by Council. ***Network Analysis***

D11.06 PIPELINE

1. Trunk mains directly supplying reticulation systems shall be designed as part of the reticulation system to carry peak instantaneous demands. (WSA 03 Part 1, sections 3 and 4) ***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)	:	850 litres per day
House and Duplex	:	3.2 EP
Home Unit and Mobile Home	:	0.75 x 3.2 EP

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. ***Peak Daily Demand***

3. Reticulation mains shall be looped to eliminate dead ends unless permitted otherwise by Council. ***Looped Mains***

4. Where a dead end is permitted to provide for future extension from staged development, the end shall be fitted with a stop valve, hydrant bend and hydrant. ***Staged Development***

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. ***Loss of Supply***

6. Each dwelling shall have an individual service tapped from the main and extending 300mm inside the lot boundary. ***Individual Service***

7. Valves are to be buried. Access to valves shall be through a valve box. For larger diameter valves, alternative designs shall be submitted for Council's approval. ***Valve Chambers***

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. ***Access Covers***

9. The direction of closing for stop valves shall be in accordance with Table D11.1 ***Valve Closing***

Table D11.1 Valve Closing Directions

Council Name/s	Direction of closing
Lismore, Kyogle, Byron, Clarence Valley	Clockwise Closing
Richmond Valley, Ballina	Anti-Clockwise Closing

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. ***Valve Maintenance***

11. In all cases pipe sizes and residual pressure shall be designed to cater for fire fighting flows:

D11.07 LOCATION

1. In designing the reticulation system, standard locations shall be followed, as ***Standard***

detailed below: ***Location***

(a) Reticulation mains shall be laid in compliance with Council's standard footpath allocation for public utilities,

(b) 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.

(c) Hydrants shall be located on all reticulation mains. The interval between hydrants shall not exceed 60 metres, at all high and low points of the main, and at dead ends.

2. Water mains located on private property shall be located in an easement of minimum width three (3) 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 pipelines.

D11.08 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. ***Geotechnical Issues, Pipe Jointing System***

   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

D11.09 GENERAL (WSA 03 Part 2)

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 1568 kPa (160m). ***Working Pressure***

2. Pipes and fittings for water reticulation shall be of suitable materials as specified. ***Type***

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. ***Colour Coding***

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 the C401 – Water Reticulation. (WSA 03 Part 1, section 4.11) ***External Protection***

5. Piers for any above ground water main shall be in accordance with the C401 – Water Reticulation (WSA 03 Drawing WAT-108). ***Piers***

6. The Designer shall allow for adequate working area, waste removal and transport arrangements where scouring points or pipe inspection locations are nominated. (WSA 03 Part 1, section 4.8) ***Special Allowances***

7. The minimum diameter of all pipes shall be 100 mm unless otherwise determined by Council. In commercial, industrial or high-rise building areas the minimum ***Diameter***

shall be DN150. In all cases pipe sizes and residual pressures shall be designed to cater for fire fighting flows. (WSA 03 Part 1, sections 2.3.1.1 and 3.7.3.1)

8. The Designer shall take regard of the limits of use for the pipeline system materials under consideration. (WSA 03 Part 2, sections 2.5, 3.6, 4.6, 5.6, 6.6, and 7.6) ***Limits of Use***

9. Where valves are specified and shown on the Drawings, they shall comply with the valve details in the C401 – Water Reticulation. (WSA 03 Part 1, section 4.7.1) ***Valves***

10. The Designer shall design thrust blocks to resist maximum pressure of the pipe, not the estimated surge pressure. ***Thrust Blocks***

11. The Designer shall consider water hammer and provide for surge control by specifying an appropriate pipe material and class selection. ***Surge Control Method***

D11.10 UNPLASTICISED, MODIFIED PVC AND ORIENTED PVC (uPVC, PVC-M and PVC-O) PIPE

1. Unplasticised PVC (uPVC) pipe shall be specified to be manufactured in accordance with AS/NZS 4020, AS/NZS 1477 Series 2, blue in colour and with rubber ring (elastomeric) spigot and socket joints. Modified PVC (PVC-M) pipes and fittings shall be specified to be manufactured in accordance with AS/NZS 4020, AS/NZS 4765, blue in colour and with rubber ring (elastomeric) spigot and socket joints. (WSA 03 Part 2, section 7). Oriented PVC (PVC-O) pipes and fittings shall be specified to be manufactured in accordance with AS/NZS 4441(Int) and with rubber ring (elastomeric) spigot and socket joints and shall be blue in colour. ***Standard***

   The pipe class selection shall be based on pumping design and site conditions and shall be minimum class 12.

2. The Designer shall ensure that PVC pipe is compatible with ductile iron (DI) pipe where necessary. ***DI Compatible***

3. Where radius is too tight to allow straight lengths to be installed as per manufacturers specifications, PVC pipes shall be pre-curved to suit the radius of any cul-de-sac road pavement in which they are to be installed. ***Pre-curved***

4. Fittings for use with PVC pipe shall be DICL elastomeric seal jointed. ***Fittings***

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

1. ABS pipes and fittings shall be specified to be manufactured in accordance with AS 3518.1 and AS 3518.2 and joined in accordance with the manufacturer's instructions using solvent cement to AS 3691. Selection of pipe class shall take into account cyclic loading. ***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 Class K9 for rubber ring (elastomeric) joints. Where pipes are to be flanged, Class K12 shall be specified. (WSA 03 Part 2, section 3) ***Standard***

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. ***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 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. ***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 in accordance with AS 1449 as for pumps specified in C401 – Water Reticulation ***Flanges***

D11.13 STEEL PIPE AND FITTINGS

1. Steel pipes and fittings shall be specified to be manufactured in accordance with AS 1579 and AS/NZS 1594 and designed to AS/NZS 2566.1. (WSA 03 Part 2, section 4). ***Standard***

2. The Designer shall specify the jointing system where long-term corrosion resistance, ease of construction or special circumstances dictate the need. The pipe jointing shall be either:

   (a) Rubber ring (elastomeric) jointed to conform to AS 1646, or

   (b) Welded with butt welding or by using a welding collar with the application of a polyethylene heat shrunk sleeve over the weld, or wrapped, or

   (c) Flanged to comply with AS 4087 to the table specified on the Drawings. Bolts and nuts for flanged joints shall be in accordance with AS 2129 and stainless steel in accordance with AS 2837 as for pumps specified in C401 – Water Reticulation.

3. The Designer shall avoid the positioning of continuously welded steel pipelines in parallel with high voltage power lines. (WSA 03 Part 1, section 4.11.3) ***Power Lines***

D11.14 POLYETHYLENE PIPE AND FITTINGS

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. (WSA 03 Part 2, section 6) ***Standard***

2. Fittings shall comply with AS/NZS 4129 with compounds to AS/NZS 4131. ***Fittings***

D11.15 GLASS REINFORCED PLASTIC (GRP) AND FITTINGS

1. Glass filament reinforced thermosetting plastics (GRP) pipes shall be specified to be manufactured to AS 3571 and designed to AS/NZS 2566.1. (WSA 03 Part 2, section 5). The Designer shall take into account surge cycles and refer to the manufacturer when the temperatures are likely to exceed 35^{o}C. ***Standard***

2. Fittings shall comply with AS 2634.

D11.16 COPPER PIPE AND FITTINGS

1. Copper tube shall be specified to be manufactured in accordance with AS 1432 in the range of DN6 to DN200 for Type A. The Designer shall take into account the requirements of AS 3500. (WSA 03 Part 2, section 2) ***Standard***

2. Capillary and compression fittings shall be specified to comply with AS 3688 and de-zincification resistant. Capillary fittings shall have silver brazed joints or solder insert capillary joints. Capillary fittings shall have silver brazed joints where under or within road pavements. ***Fittings***

D11.17 STOP VALVES

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. ***Standard***

2. Flanges shall comply with AS 4087 Figure B5. ***Flanges***

3. The direction of spindle rotation for closing stop valves shall be in accordance with Table D11.2 ***Spindle Rotation***

Table D11.2 Valve Closing Directions

Council Name/s	Direction of closing
Lismore, Kyogle, Byron, Clarence Valley	Clockwise Closing
Richmond Valley, Ballina	Anti-Clockwise Closing

4. Valves shall be operated by a removable key. ***Operation***

5. Stop valves shall be protected internally and externally with Fusion Bonded coating in accordance with AS 4158 or equivalent protection approved by Council. ***Corrosion Protection***

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.

D11.18 NON-RETURN VALVES

1. Non-return valves shall be full-bodied swing flap type manufactured in accordance with AS3578. ***Standard***

2. Flanges shall comply with AS 4087 Figure B5. ***Flanges***

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. ***Corrosion Protection***

D11.19 SPRING HYDRANTS

1. Spring hydrant bodies shall be manufactured in accordance with AS/NZS 2544 or AS 3952. ***Standard***

2. Spring hydrants shall be protected internally and externally with Fusion Bonded coating in accordance with AS 4158 or equivalent protection approved by Council. ***Corrosion Protection***

D11.20 PRESSURE REDUCING VALVES

1. Pressure reducing valves shall be Cal-Val style or an equivalent approved by the Council. ***Type***

2. Pressure reducing valves shall be installed in accordance with the manufacturers written instructions. ***Installation***

D11.21 SERVICE CONNECTIONS

1. All house service connections shall be the READYTAP system type installed at the time of pipeline construction.

2. 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.

D11.22 GIBAULT JOINTS

1. Gibaults shall be long barrel in accordance with Sydney Water Board design. 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

D11.23 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***

   (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. The Designer is also to take into consideration any local policy with respect to sea level rise. ***Protection Against Flooding***

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. ***Protection Against Flotation***

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. ***Pump Capacity***

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. ***Pump Pipework***

11. Where there is negative suction head at the pump inlet, provision shall be made to facilitate priming of each pump. ***Pump Prime***

12. The Designer shall provide for alarms and signals systems as required by Council. ***Alarms and Signals***

D11.24 PUMP

1. Pumps shall comply with the WS-SPEC. 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. ***Pump Type***

2. Pump sets are to be interchangeable within each pump station where standby pumps are installed. ***Inter-Changeable***

3. The Designer shall design structural steelwork in accordance with HB 48. ***Structural Steelwork***

D11.25 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 the Local Supply Authority.

7. The works shall be designed in accordance with and subject to the provisions of MEW E101, 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 pump start signal from the SCADA or telemetry control system, 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

D11.26 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***

2. The minimum size of the consumers mains shall be sized to satisfy the following requirements: ***Minimum Size***

   (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 the Local Supply Authority.

   (e) Pole termination method shall be determined in consultation with the Local Supply Authority.

3. Power supply changeover provisions and connection point for back up generator are to be provided.

D11.27 TELEMETRY

1. The Designer shall provide for telemetry requirements in accordance with the schedule supplied by Council. ***Schedule***

2. The telemetry system is to be compatible with the existing systems in use. ***Compatibility***

D11.28 LADDERS

1. Ladders shall comply with AS 1657 and applicable Occupational Health and Safety legislation. ***Standard***

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. ***Ladder Landings***

3. Ladder cages shall not be used on ladders in pump station wells. ***Ladder Cages***

D11.29 OTHER APPURTENANCES

1. The Designer shall provide for machinery lifting equipment including pump chains as necessary. ***Lifting Equipment***

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. ***Gauges***

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. ***Covers***

DOCUMENTATION

D11.30 RESERVED

RESERVOIRS

D11.31 RESERVOIRS

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" ***Design Criteria***

2. Reservoirs are to be sized to provide a usable storage volume equal to one day's supply at ultimate daily demand. ***Sizing***

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 ***Appurtences***

   (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 ladders/platforms with inbuilt systems to prevent unauthorised access

(g) Roof over entire reservoir, bird and vermin proofing

(h) Davit arm and divers platform.

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***