FEDERATION COUNCIL

Engineering Guidelines for Subdivisions and Development Standards

PART 4
WATER RETICULATION DESIGN

JULY 2020

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TABLES

1. INTRODUCTION

This Part of Council's 'Engineering Guidelines for Subdivisions and Developments' is related to water reticulation. Reference to Council in this document can also be interpreted as the Water Authority.

The design of water reticulation shall generally be in accordance with the latest version of the Water Services Association of Australia (WSA) 'Water Supply Code of Australia (WSA03)'. **This part of Council's 'Engineering Guidelines' take precedence over WSA03** (i.e. these are Council's requirements which may be different to WSA03).

These WSA updates incorporate references to dual water supply. If the WSA standard is updated refer to the equivalent clause. References to WSA codes are to the WSA code which was current at time of publication of this guideline if the WSA standard is updated refer to the equivalent clause

The other parts of the 'Engineering Guidelines for Subdivisions and Developments' are as follows:

Part 1 General Requirement

Part 2 Design of Roads

Part 3 Stormwater Drainage Design

Part 4 Water Reticulation Design

Part 5 Sewerage Reticulation Design

Part 6 Landscaping, and Measures for Erosion, Sedimentation and Pollution Control

Part 7 Testing

This part of the 'Engineering Guidelines' is set out in the same order as WSA03 for ease of cross-referencing.

2. REFERENCE DOCUMENTS

The format of the guidelines has been simplified by making reference to both National and State Standards where applicable. Where these standards vary from the referenced standards the variations are highlighted and cross-referenced. The current version of the referenced standard will apply. The references below were current at time of publication of this standard. If any of the references are updated refer to the equivalent clause in the updated versions. These guidelines shall take preference over the referenced standards. In addition to the criteria outlined in this manual, any relevant acts, regulations and Australian Standards will apply.

In New South Wales, RMS referenced standards will apply.

Water Supply Code of Australia WSA03 – 2011 Version 3.1

AS 2544 Grey iron pressure fittings

AS 2280 Ductile iron pipes and fittings

AS 3680 Polyethylene sleeving for ductile iron piping

AS 4799 Installation of underground utility services and pipelines within railway boundaries

Council Standard Drawings

AS 4765 Modified PVC (PVC-M) pipes for pressure applications

AS 4441 Oriented PVC (PVC-O) pipes for pressure applications

AS 4130 Polyethylene (PE) pipes for pressure applications

AS2566 Buried flexible pipelines

Water Services Specification, issue 3 Rev 0 June 2000 (WS-SPEC)

Abbreviations

BCA	Building Code of Australia
DICL	Ductile Iron Cement Lined
NSW	New South Wales
MGA	Map Grid Australia
PE	Polyethylene
PVC	Polyvinyl Chloride
RFS	Rural Fire Service
WSA	Water Services Association

3. GENERAL

3.1 SCOPE (REFER WSA03 SECTION 1)

Council (as the Water Authority) will not provide a 'Concept Plan' for the localised water supply system. It is the responsibility of the 'Designer' to provide a 'Concept Plan' for the localised water supply system, particularly so if the proposed development is going to be staged (i.e. developed in stages). Council will, however, provide details of items (a) to (j) inclusive as specified in Clause 1.2.5.1 of WSA03, where available.

If such a staged development is proposed the 'Designer' shall provide an indicative overall concept plan of the development at the time of submitting the first stage to Council for approval. This concept plan shall not be binding with respect to the proposed layout/staging; however, the final number of tenements cannot differ by more than 20% between the original concept plan and the ultimate constructed development.

All development in bush fire prone areas is to comply with the RFS NSW planning for bushfire protection.

4. SYSTEM PLANNING

4.1 SYSTEM PLANNING PROCESS

4.1.1 EXTENDING/UPGRADING AN EXISTING WATER SUPPLY SYSTEM (REFER WSA03-2.2.2)

In lieu of (a) and (b) of this Clause of WSA03, the 'Planner/Designer' shall:

a. Take into account points (i), (ii) and (iii) which will be provided by Council in designing the extension/upgrade of an existing water supply system to ensure that it adequately services any existing and any future customers on that system

b. Provide details of the proposed extension/upgrade in the preliminary/early phases of the design and the effect that the extension/upgrade will have on councils existing system

c. The outcome of this trialling may lead to Council placing additional requirements on the proposed extension/upgrade and/or the developer to augment the existing system to meet the demands of the proposed extension/upgrade

4.2 DEMANDS (REFER WSA03-2.3.1)

Use Table 2.1 WSA03-2002-2.3 unless the demand of the proposed development is known, seek advice from Council for peak hour demand rates

4.3 SYSTEM HYDRAULICS

4.3.1 MINIMUM SERVICE PRESSURE (REFER 2.5.3.3 AND TABLE 2.3)

For Corowa and Mulwala. the minimum allowable service pressure shall be 200 kPa (20 m head) throughout the reticulation system when meeting a peak instantaneous demand of 0.15 litres per second per tenement, For Howlong and Balldale the minimum allowable service pressure shall be 160 kPa (16 m head) throughout the reticulation system when meeting a peak instantaneous demand of 0.15 litres/second/tenement. These minimum pressures are to be achieved with the relevant supplying water storage reservoir two thirds full.

4.3.2 PRESSURE VARIATION ANALYSIS (REFER WSA03-2.5.4)

Where distribution and reticulation systems are designed to control diurnal pressure variations, the diurnal demand factors are to be used for each customer category. Consult with Council prior to undertaking any analysis to determine requirements.

4.3.3 DETERMINING PRESSURE SUPPLY ZONE (REFER WSA03-2.5.5)

Corowa has low pressure and high pressure water supply zones. The "Planners/Designers" shall discuss with the Authority in the early stages of the design phase which pressure supply zone a proposed development will be connected to.

5. HYDRAULIC DESIGN

5.1 SIZING OF MAINS

5.1.1 MINIMUM PIPE SIZES (REFER WSA03-3.1.2)

The minimum acceptable pipe size is 100 mm diameter for 'residential' areas and 150 mm diameter for commercial and industrial areas.

The minimum pipe size for the bowls of courts, cul-de-sacs shall be 50 mm copper (65 mm nominal diameter if polyethylene (PE) pipe is being used), however fire hydrants must have a minimum main diameter of 100 mm on the supply side.

5.1.2 FIRE FLOWS (REFER WSA03-3.1.5)

The following applies in addition to Clause 3.1.5 of WSA03:

A minimum supply head of 16m is to be achieved at any fire hydrant within the reticulation system when drawing 11 litres/second from the individual hydrant and meeting a peak instantaneous demand of 0.10 litres/second/tenement throughout the system. A tenement is deemed to be the demand relating to a typical residential lot. Where the demand differs from that of a standard tenement the anticipated water supply demand for each development shall be used in undertaking the above calculations.

5.2 DESIGN PRESSURES

5.2.1 MAXIMUM DESIGN PRESSURE (DENOTED ON DESIGN DRAWINGS)

The maximum design pressures are required to be recorded on the 'design drawings' and an overall concept plan at strategic locations that shall be included with the design computations provided to Council when the design is submitted for approval.

5.2.2 EMPIRICAL SIZING OF RETICULATION MAINS (NOTES) (REFER WSA03-3.1.3)

Minimum Class 12 for PVC-M pressure mains, Class 16 for PVC-O and PE pressure mains and Class 20 for DICL pressure mains.

5.3 PIPE AND FITTINGS PRESSURE CLASS

5.3.1 PRESSURE CLASS OF SYSTEM COMPONENTS (REFER WSA03-3.3)

The minimum pipe and fittings pressure class for reticulation mains shall be PN 20 where ductile iron cement lined (DICL) pipes are used, PN 16 DIOD where PVC-O pipes are used and PN 12 DIOD where PVC-M rubber ring jointed pipe are used. PVC-U pressure pipes shall not to be used in pressure mains.

Ductile iron fittings shall be minimum pressure class PN 16.

5.4 PRODUCTS AND MATERIALS (REFER WSA03-4)

The following pipeline materials are currently approved for use however other materials may be considered but will require Council approval on a case-by-case basis.

5.4.1 PROPERTY SERVICE CONNECTIONS

PN 20 ductile iron cement lined (DICL) spigot and socket, rubber ring jointed pipe manufactured in accordance with AS 2280. If DICL flanged pipe is to be used the class shall be flange class pipe.

Type ‘A’; copper pipe manufactured in accordance with AS 1432.

NOTE: Copper is only permitted for the bowl sections of courts, cul-de-sacs and property services. Pipeline fittings for joining Copper pipe to be silver soldered or copper press fittings complying with AS 3688 and AS/NZS4020.

Class 16 PE is only permitted for the bowl sections of courts, cul-de-sacs and property services. However if the property service has to cross a road PE can only be used if it is inserted into a sleeve pipe of minimum Class 12. Sleeved pipes shall be installed so that water hammer and pressure fluctuations do not cause pipe movement within the conduit.

Pipeline fittings for joining PE to be only those approved by Council; and Pipeline fittings for joining DICL and/or PVC pipes shall be cast or ductile iron, cement lined and conforming to AS 2544 and AS 2280 respectively. If gibault joints are used they shall be the elongated type or long barrel vari gib type.

Copper tube Type A and Polyethylene (PE) pipe with trace wire is approved for use in property service connections. Copper tube is not approved for water reticulation use other than courts and cul-de-sacs. However if the property service has to cross a road, copper tube and PE pipe with trace wire is to be inserted into a sleeve pipe of minimum Class 12. Sleeved pipes shall be installed so that water hammer and pressure fluctuations do not cause pipe movement within the conduit.

5.4.2 WATERMAINS DN100 TO DN250

Between DN100 and DN250 water mains shall be constructed in:

- PVC-M (AS/NZS 4765), Series 2 Blue PN 12 rubber ring joint. PVC must be lilac coloured where used in reuse or olive striped for raw water systems
- PVC-O (AS 4441), Series 2 Blue PN16 rubber ring joint. PVC must be lilac coloured where used in reuse or olive striped for raw water systems
- DICL (AS/NZS 2280), PN 20 or PN 35 rubber ring joint, polyethylene wrapped AS 3680; if DICL flanged pipe is to be used the class shall be flange class pipe
- Polyethylene (AS/NZS 4130) minimum PN 16, blue striped for potable systems, lilac striped for reuse or olive striped for raw water systems. All jointing to be electro-fusion or butt-welded
- Place traceable marker tape in all PVC and Polyethylene trenches

5.4.3 WATERMAINS DN300 TO DN450

DN300 to DN450 water mains shall be constructed in:

- PVC-M (AS/NZS 4765), Series 2 Blue PN 12 rubber ring joint. PVC must be lilac coloured where used in reuse or olive striped for raw water systems
- PVC-O (AS 4441), Series 2 Blue PN16 rubber ring joint. PVC must be lilac coloured where used in reuse or olive striped for raw water systems

- DICL (AS/NZS 2280), PN 20 or PN 35 rubber ring joint, polyethylene wrapped AS 3680; if DICL flanged pipe is to be used the class shall be flange class pipe

- Place traceable marker tape in all PVC and Polyethylene trenches

5.4.4 WATERMAINS DN500 AND LARGER

DN500 and larger water mains shall be constructed in:

- DICL (AS/NZS 2280), PN 20 or PN 35 rubber ring joint, polyethylene wrapped AS 3680; if DICL flanged pipe is to be used the class shall be flange class pipe

5.4.5 FITTINGS

Pipeline fittings for joining DICL, DIOD and/or PVC pipes shall conform to AS 2544 and AS 2280 respectively. If gibault joints are used they shall be the elongated type or long barrel vari gib type.

6. GENERAL DESIGN

6.1 GENERAL REQUIREMENTS

6.1.1 DESIGN TOLERANCES (REFER WSA03-5.1.1)

The following shall apply in lieu of Clause 5.1.1(a) and (b) (ii):

"The alignments shall be calculated to the nearest 5mm and expressed/shown on the drawings to two decimal places with the rounding application being 0.4mm rounded down to the second decimal place and rounded up to the second decimal place of a metre.

The horizontal alignment shall be referenced to MGA.

6.1.2 LEVELS (REFER WSA03-5.1.2)

In addition to the requirements of Clause 5.1.2; where a longitudinal elevation forms part of the design drawings, levels shall be specified at:

- Every 15 m interval
- Horizontal changes if alignment where a bend(s) is used
- Vertical changes if alignment where a bend(s) is used

6.2 RETICULATION DESIGN FOR WATER QUALITY

6.2.1 LAYOUT OF WATER MAINS (WSA03.5.2.1)

Termination points or dead-ends will not be accepted by Council unless part of a staged construction approach. In the case of a staged construction approach, a flushing point will be installed at the end of the water main for each stage.

6.2.2 REDUCED SIZE MAINS (WSA03.5.2.4)

In Lieu of note 2 under Table 5.1 Council will require a looped main or link main.

6.3 LOCATION OF WATERMAINS

6.3.1 GENERAL (REFER WSA03-5.4.1A)

Additional to clause 5.4.1a watermains are to be located on the nature strip with the pipe 3m from the property boundary. Alternative alignments are subject to approval from the Council. Road crossings are to be approved on a case by case basis and may include a requirement for under boring.

6.3.2 WATERMAINS NEAR TREES (REFER WSA03-5.4.7)

In lieu of Clause 5.4.7 of WSA03 advice shall be sought from Council. Further, the Council may require portions of the main to be underbored – this shall be specified on the Design Drawings. Particular attention is required in relation to the impact on the tree root system from the cumulative impact of the construction of all services and works. Pipes under trees are to be ductile iron or in an approved sleeving.

6.3.3 RAILWAY RESERVES (REFER WSA03-5.4.10)

In addition to watermains being laid within railway reserves (either along or across them) being authorised by the Railway owner and complying with AS 4799, the design and ultimate construction shall comply with the requirements of the Railway owner.

6.3.4 CROSSING CREEKS OR DRAINAGE RESERVES (REFER WSA03-4.11)

Stabilisation or directional bore as approved by Council.

Pipes under existing crossing creeks or drainage reserves are to be encased or directionally bored as approved by Council.

6.4 CONNECTION OF NEW MAINS TO EXISTING MAINS (REFER WSA03-5.9)

Where it is necessary to connect to, tap into, or relocate an existing water supply main, Council Staff should carry out this work at the developer's expense.

The developer should lodge payment for the work in advance and give 14 days' notice of when connection is required.

Council will provide all pipes and fittings required to complete the connection or tapping at the developer's expense.

6.5 PROPERTY SERVICES (REFER WSA03-5.11)

A common property service, which is then further divided to service additional properties, is not permitted.

Property services shall be located such that the point where the meter assembly is located is within 500mm of the property's left side (when looking at the property from the road) boundary. Coordinate service design with other services.

6.6 OBSTRUCTION AND CLEARANCES (REFER WSA03-5.12)

The maximum individual joint deflection for DICL in either the horizontal or vertical plane or a multiple joint (i.e. where there is deflection in both planes) shall not be more than 75% of the manufacturer's recommendation.

Pipe deflection for DIOD PVC shall be to Manufacturers Specifications (i.e. No deflection in joints, deflection bends at midpoint of pipe).

7. STRUCTURAL DESIGN

7.1 PIPE ANCHORAGE

7.1.1 ANCHOR BLOCKS (REFER WSA03-7.9.3)

Anchor blocks are to be constructed in accordance with WSSA.

Rapid set concrete anchor blocks are not allowable

7.1.2 RESTRAINED ELASTOMERIC SEAL JOINT WATER MAINS (REFER WSA03-7.9.5)

Not accepted.

8. APPURTENANCES

8.1 STOP VALVES

All stop valves shall be anticlockwise closing.

8.1.1 GATE VALVES (REFER WSA03-8.2.2.2)

8.1.2 STOP VALVES FOR TRANSFER/DISTRIBUTION MAINS (REFER WSA03-8.2.3)

8.2 AIR VALVES

8.2.1 INSTALLATION DESIGN CRITERIA

Air Valve Types to be only those approved by Council.

8.2.2 AIR VALVE TYPES (REFER WSA03-8.4.3)

Air Valve Types to be only those approved by Council.

8.3 SWABBING JOINTS (REFER WSA03-8.7)

Not required.

8.4 HYDRANTS

8.4.1 HYDRANT TYPES (REFER WSA03-8.8.4)

Only spring type hydrants accepted.

8.4.2 HYDRANT SPACING (REFER WSA03-8.8.8)

Fire hydrants are to be provided in the main at maximum spacing of 60m and flushing hydrants are to be installed at all temporary dead ends for the purpose of flushing the main in addition to fire fighting. In addition provide hydrants / fire protection in accordance with BCA and fire authority requirements

Table 1: Fire Fighting Flow Demands for New Domestic Properties

Class of Building	Fire Fighting Flow (L/s)
1. Properties that are zoned for commercial (3) or industrial (4) purposes in the relevant LEP.	20
2. Any property not included in Category 1.	10

8.4.3 HYDRANT LOCATIONS (REFER WSA03-8.8.9)

Always in Road Reserve in accordance with Fire Authority requirements. Reticulation mains are not to be located within the road carriageway or shoulders, excepting road crossings.

8.5 FIRE FIGHTING FLOWS

Comply with fire authority requirements.

When checking a property for firefighting adequacy, the fire flow should be taken from the closest hydrant to the property.

In commercial and industrial areas or in areas of high rise buildings a minimum of 150mm diameter pipes should be used. Special firefighting requirements exist for some large industries or in cases where fire could be especially severe.

The water systems are not designed, nor intended, to fight bush fires where flows in excess of the design allowances nominated here are attempted to be drawn from the system.

8.6 DISINFECTION OF WATERMAINS

All new watermains are to be disinfected prior to connection to Council's system as per Council requirements. Disinfection shall be carried out by Council or by an approved contractor.

9. DESIGN REVIEW AND DRAWINGS

9.1 DESIGN REVIEW (REFER WSA03-9.1)

Submit a water supply check list.

9.2 DESIGN DRAWINGS (REFER WSA03-9.2)

Provide longitudinal sections for trunk mains in accordance with WSA.

10. STANDARD DRAWINGS

Council Standard Drawings take precedence over WSA.

No.	Description	Drawing No.
1	Water Service House Connection – On Same Side of Road as Lot	SD 800
2	Water Service House Connection – On Opposite Side of Road as Lot	SD 801
3	Water Service House Connection – Meter Connection Details	SD 802

Version	Date	Changes/Amendments
1	November 2018	Approved issue
1.1	July 2020	Minor Amendments