



WATER DESIGN STANDARD

**Supplementary Information to the WSAA Water Supply Code of Australia
WSA 03-2011-3.1 Melbourne Retail Water Agencies Edition Version 2.0**

**Western Water
January 2018**

Executive Summary

This Design Standard has been produced as a guide for use by technical personnel involved with the design and construction of drinking and non-drinking water mains within Western Water's service area.

The design and construction of water mains required for provision of services to subdivisions and other land development works should be carried out in accordance with this Design Standard and the WSAA Water Supply Code of Australia WSA 03-2011-3.1 Melbourne Retail Water Agencies Edition Version 2.0 ("the Water Code"). The requirements set out in this Design Standard take precedence over those in the Water Code.

This document is a guideline only, and not intended to be a detailed specification for the purposes of the design and construction of drinking and non-drinking water infrastructure. Designers and constructors are responsible for the respective aspects of the design and construction process and the justification of any variations from the requirements set out in the Water Code and this Design Standard. Where there are any discrepancies or inconsistencies between the Water Code, this Design Standard, or any other documents, standards or practices these should be discussed with Western Water prior to proceeding.

Enquiries or suggestions relating to the information set out in this Design Standard are welcome and can be directed via email to designstandards@westernwater.com.au

Western Water will update this document as changes become necessary, and the most up to date version will be available on our website.

This edition applies to all developments and water design projects issued to commence design on or after the publication date unless otherwise stated by Western Water.



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Part 0: Glossary of Terms

Non-Drinking Water

Replace first sentence:

Any water other than, drinking water and raw water suitable for potable supply, including wastewater, stormwater, bore water, ground water, lake or river water, which has been treated to meet a Standard (as defined by the Regulator), and which is satisfactory for its intended use(s).

Part 1: Planning and Design

3 HYDRAULIC DESIGN

3.1 Sizing

3.1.3 Empirical sizing of reticulation mains

Additional information to Table 3.2:

Nominal Diameter (mm)	Capacity of main (single direction feed only) Number of lots serviced		
	DRINKING WATER (Drinking water only systems)	DRINKING WATER (3 rd pipe systems)	NON-DRINKING WATER (3 rd pipe systems)
100	40	62	57
150	160	246	229
200	400	615	571

NOTE: for pipe diameters below 100mm, the standard WSAA design must apply without and reduction for 3rd pipe systems.



4 PRODUCTS AND MATERIALS

4.1 General

Additional requirement:

Products and materials shall be in accordance with City West Water approved products and materials specified on the MRWA Portal www.mrwa.com.au/Pages/Products.aspx unless otherwise amended in this document.

4.2 Differentiation of Drinking and Non-Drinking Pipe Systems

4.2.1 Principles

Additional:

Refer Western Water amended definition for Non-Drinking Water

4.2.3 Water supply mains – non-drinking water

Additional requirement:

Plain purple only (black and purple stripes not permitted).

4.2.5 Property services – non-drinking water

Additional requirement:

Plain purple only (black and purple stripes not permitted).

Amend Table 4.1 for PE pipe on Reticulation Mains in Non-Drinking Water Systems to:
Plain purple only (black and purple stripes not permitted).

4.2.6 Marking tapes

Additional requirement:

Detectable marking tape is required over all drinking and non-drinking water mains and property services.

4.4 PVC Pipeline Systems

Delete item (a) referencing pre-tapped connections

Pre-tapped connections are not permitted

Additional requirement:

PVC-O is not permitted for use within Western Water’s region.

4.7 GRP Pipeline Systems

Additional requirement:

Written approval from Western Water must be obtained for any GRP pipe materials prior to their proposed use.



4.8 Protection against Degradation

4.8.8 Bolted connections

Delete the first and second paragraph and replace with the following:

All bolted connections to be provided with additional corrosion protection in the form of an encapsulating system of bolt head and nut sealing caps filled with corrosion prevention priming paste wrapped with petrolatum tape or with PE sleeving and taped.

4.9 Pipeline Systems

4.9.1 General

Additional Clause:

Drawing MRWA-W-103 Table 103 F Pipeline system preferences:

		Normal Conditions	Contaminated Ground	Urban Centre or High Risk
DN < 375 Pipework	Weak Ground (i.e. AHBP <50 kPa)	PE* or Restrained Joint DI	Restrained Joint DI	PE*, Restrained Joint DI or Welded MS
	Normal Ground (i.e. AHBP >50 kPa)	PVC-M or PE*	DI	
DN ≥ 375 Pipework	Weak Ground (i.e. AHBP <50 kPa)	PE*, Restrained Joint DI or welded MS	Restrained Joint DI or Welded MS	PE* or Welded MS
	Normal Ground (i.e. AHBP >50 kPa)	PE*, Restrained Joint DI, Welded MS	DI, Welded MS	

* Note: Use of PE is subject to conditions of the Western Water Approved Products for Pressure Applications

5 GENERAL DESIGN

5.4 Location of Water Mains

5.4.14 Water mains on curved alignments

Amendment to MRWA-W- 212:

Written approval must be obtained from Western Water prior to use of double socket connectors or pre-tapped connectors to form a curved alignment.

5.10 Termination Points

Additional requirement:

Western Water generally adopts Figure 108-C and Figure 108-D for drinking water only areas and Figure 108-G and Figure 108-H for dual water.

The end of the cul-de-sac shall be a maximum of 60m from the nearest hydrant for firefighting purposes as shown on MRWA-W-109.

Western Water requires the provision of a washout at the end of all sub mains as shown in Figure 109-D on drawing MRWA-W-109.

MRWA 109 Figure 109-E – not used by Western Water

5.11 Property Services

5.11.2 Connections to water mains

Amendments:

- Pre-tapped connectors are not permitted by Western Water. Tapping bands shall be used.
- Drinking water and non-drinking water property services are not permitted to be installed in the same duct.
- Separate ducts are permitted for each service

Additional requirement:

Direct property service connections are not permitted on mains \geq DN300 unless otherwise approved by Western Water. Written approval from Western Water must be obtained for tapping a 300mm or larger watermain.

5.11.3 Services, outlets and meters

Additional requirement:

Refer to Western Water's Metering and servicing guidelines (visit www.westernwater.com.au)

Installation of off takes greater than DN100mm:

- Tapping bands shall be stainless steel or gunmetal.
- Single bolt tapping bands are only permitted on mains \leq DN150.
- Ferrule shall be TPFNR type.

7 STRUCTURAL DESIGN

7.4 External Forces

New Clause:

7.4.6 Backfill

For works within Western Water's service area, the MRWA Backfill Specification 04-03.1 (revision 1) shall apply.

8 APPURTENANCES

8.2 Stop Valves

8.2.1 Product Specifications

Additional requirement:

Valve closing direction shall be as shown in Table WW 8.7. Spindle caps on clockwise closing valves shall be painted red to indicate clockwise closing direction.

**TABLE WW 8.7
WESTERN WATER VALVE CLOSING DIRECTIONS**

Area	Water Valves
Sunbury, Diggers Rest, Bulla	Anti-clockwise closing
Romsey, Lancefield	Anti-clockwise closing
Gisborne, Woodend, Riddells Creek	Anti-clockwise closing
Macedon, Mt Macedon	Anti-clockwise closing
Melton, Rockbank, Eynesbury, Toolern	Clockwise closing
Bacchus Marsh, Darley	Anti-clockwise closing

The clockwise closing direction area of Melton, Rockbank, Eynesbury and Toolern is shown in Figure WW 8.1 below:

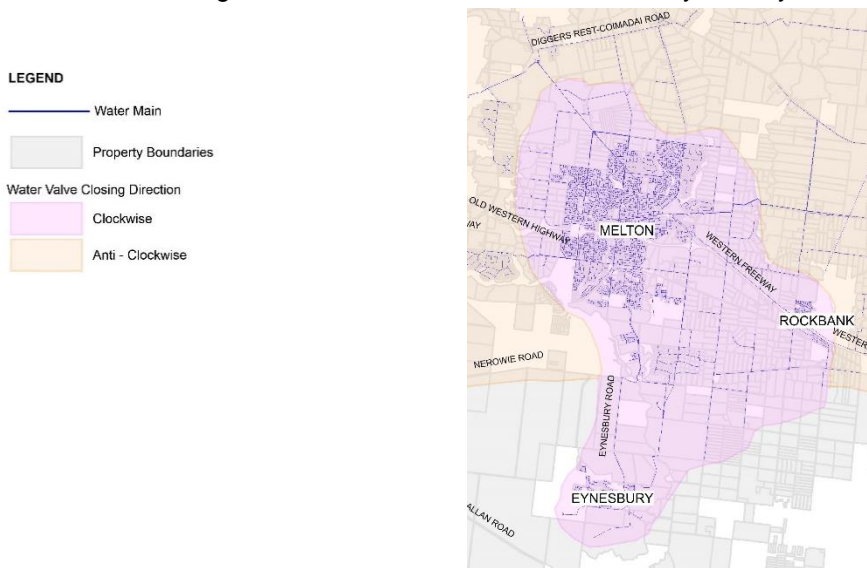


FIGURE WW 8.1 VALVE CLOSING DIRECTION AREAS

8.2.2 Installation design and selection criteria

8.2.2.1 General

Replace 1st and 2nd paragraphs with the following:

Flanged valves shall be used on all offtakes and cut-ins. All valves shall be anchored with in-line thrust restraint.



The closing direction of all water valves is dependent on the township area and shall be as shown in Table WW 8.7. All water valves shall be direct buried (not installed in pits) unless they are located on above-ground pipework.

8.2.2.2 Gate Valves

Add the following after the 1st sentence:

The closing direction of all water valves is dependent on the township area and shall be as shown in Table WW 8.7.

8.2.2.3 Butterfly Valves

Replace 2nd paragraph with the following:

The closing direction of butterfly valves is dependent on the township area and shall be as shown in Table WW 8.7.

8.2.3 Stop valves for transfer/distribution mains (> DN 300)

Add the following row to Table MRWA 8.5 outlining Western Water valve type preferences:

**TABLE MRWA 8.5
VALVE TYPES WATER AGENCY PREFERENCES**

	Resilient Seated Gate Valves	Resilient Seated Gate Valves with Integrated Bypass	Metal Wedge Gate Valves	Butterfly Valves
Western Water	Buried valves ≤DN 450	Buried valves >DN 450 to DN 600	Not normally used	Above-ground valves and valves >DN 600

Stop valves shall incorporate bypasses as per the following:

Main Size (WW)	Bypass Main Size
>DN375 and ≤DN600	DN100
>DN600 and ≤DN1050	DN150
>DN1050 and ≤DN1200	DN225

Closing direction of all valves shall be as per Table WW 8.7 in clause 8.2.1.

8.2.4 Stop valves for reticulation mains (≤ DN 300)

Additional requirement:

For water mains ≤ DN 150 stop valve spacing criteria shall be based on a maximum of 40 properties connected and Maximum spacing 300m.

8.2.7 Stop valves – location and arrangements

8.2.7.2 Arrangement 1

Additional requirement:

Western Water’s preference is for the use of flanged valves for Arrangement 1.

8.6 Scours and Pump-out Branches

8.6.2 Design

Additional requirement:

(g) non-drinking water scours shall as far as practicable be located adjacent to and discharged directly to the wastewater sewerage system.

8.6.5 Scour locations

Additional requirements:

Non-drinking water scours shall be provided at maximum spacing of 500m and shall be located, as far as practicable, within 25m of a wastewater sewerage structure, and positioned so to enable the structure to be reached with hoses without the need to cross a driveway or a road.

For Class A recycled water scours shall include (but not limited to) the following details;

- A buffer distance of greater than 100m between surface water and large (greater than 300mm diameter) recycled water mains,
- Flushing points (hydrants/ scour valves) on the recycled water reticulation system to discharge via sewer manhole or eductor pit wherever possible.

If management actions cannot be achieved, an environmental risk assessment will be provided to Western Water to demonstrate how risks to waterways are managed.

8.8 Hydrants

8.8.3 Hydrant operation principles

Additional requirement:

Hydrants for fire fighting shall only be installed on 'Class A' non-drinking water systems where the non-drinking water system has been designated 'Class A' as a main. Otherwise fire fighting hydrants shall be installed on the drinking water system.

Duck foot bend to be used for all washout assemblies.

8.8.4 Hydrant types

Additional requirement:

All hydrants shall be in-ground spring type. In rural areas (i.e. where there is no kerb and channel) all hydrants also have an L-type cover above the in-ground hydrant along with marker posts and pavement markers. L-type covers shall not be used in residential zones.

8.8.9 Hydrant location

Additional requirement:



Non-drinking water hydrants shall be provided at maximum spacing of 500m and shall be located, as far as practicable, within 25m of a wastewater sewerage structure, and positioned so to enable the structure to be reached with hoses without the need to cross a driveway or a road.

Table 8.6 FIRE HYDRANT SPACING REQUIREMENTS

Agency	Residential MFB	Residential CFA	Commercial & Industrial MFB	Commercial & Industrial CFA	Urban Centres ¹	Rural Areas
Western Water	120 m	200 m	90 m	120 m	50 m	500 m

8.10 Surface Fittings and Markings

8.10.3 Marking of surface fittings

Additional requirement:

The shape and colour of surface fitting surrounds are required to satisfy the following MRWA-W-301 and MRWA-W-302;

- Non-drinking water surface fitting surrounds (Non –Trafficable) should be concrete, round unless otherwise approved in writing by Western Water
- Drinking water surface fittings to be MRWA-W-302 Type B unless otherwise approved in writing by Western Water

Where reference in MRWA is to 'DV'/'Divide Valve' replace with 'CV'/'Critical Valve'

New section 8.12:

8.12 Bulk Water Meters

Western Water policy for network metering refer www.westernwater.com.au.

WW approved flowmeters shall be installed within a suitably sized concrete pit and connected to Western Water’s SCADA system.

9 DESIGN REVIEW AND DRAWINGS

9.1 Design Review

Western Water requires the Water Design Checklist (attached in Appendix A of the Design Standard) to be completed and submitted along with the design drawings for auditing purposes. New Paragraph:

Following completion of the design, the Designer is required to submit the design to Western Water with the Design Verification Form.

In general, Western Water will audit designs in the order they are received. It is Western Water's expectation that all designs submitted for auditing will comply with Western Water's design standards and will match the information provided in the accompanying Water Design Checklist. Where discrepancies are found, the Designer will be expected to revise the design drawings and/or checklist and submit them for re-auditing.

Part 2: Construction

17 TRENCH FILL (BACKFILL)

New sentence to clarify the applicable version of backfill specification:

Trench fill is to comply with the requirements of Clause 7.4.6 Backfill



Appendix A – Water Design Checklist

Criteria	Complete	Comments
System Planning		
Have road and drainage plans been submitted?		
Are mains of adequate size to serve current and future subdivision?		
Does minimum residential service pressure exceed 15m?		
Does minimum commercial/industrial service pressure exceed 20m?		
Is continuity of mains in and out of subdivision identified?		
Do mains extend to the limits of subdivision?		
Do mains cater for all allotments?		
Hydraulic Design		
Has minimum 150mm diameter been provided in industrial/commercial zones?		
Is sizing of mains satisfactory (i.e. 100mm main for up to 40 lots – refer clause 3.1.2 and 3.1.3)?		
Are hydraulic pressure ratings correct (generally min PN16 except for 63PE)?		
Is the Design Head shown on the drawings and is it correct?		
Products and Materials		
Are the products and materials used approved?		
Is detectable marker tape specified for all mains?		
Is all PVC pipeline used M-PVC? (PVC-O is not approved)		
General Design		
Are general location and offsets correct?		
Are all mains located outside of private property?		
Are any environmental requirements listed on the drawings?		
Are cul-de-sac/court bowl designs in accordance with standards?		
Is the horizontal alignment adequate including curved mains and thrust restraints?		
Is the vertical alignment adequate?		

Criteria	Complete	Comments
Are there adequate clearances from other services and obstructions?		
Is minimum cover provided?		
If bored road crossings are used, is continuous pipe or single pipe joint used?		
Are all road, creek and railway crossings perpendicular? Are all special crossing requirements shown on the drawings?		
Is cathodic protection used for MSCL pipelines longer than 10m?		
Are the correct type of conduits and sleeving used?		
Do flanged joints have appropriate insulation?		
Are adequate details of connections to existing mains shown? Have under pressure tappings been used where possible?		
Are details provided on how redundant pipelines are to be decommissioned?		
Structural Design		
Are any mains to be located in fill? Has satisfactory information been provided to support the adequacy of the fill as foundation for the main?		
Are any mains to be located in unstable ground and has this been addressed in the design?		
Are correct thrust restraint details and sizing shown?		
For dual water systems has an appropriate method restraint been detailed?		
Are bulkheads or trench stops required? (i.e. normally slopes exceeding 5%)		
Appurtenances		
Are valves located appropriately?		
Does maximum size of shutoff areas comply with standards? Are there sufficient numbers of valves?		
Is the valve closing direction clearly shown on the drawings?		
Are shut valves at zone boundaries shown and correctly drawn?		
Are hydrants located at high and low points and with fire fighting spacing requirements?		

Criteria	Complete	Comments
Is at least 1 hydrant located within each shut off block? Are their sufficient hydrants and air valves to enable charging of new mains?		
Are non-drinking water scours provided at maximum spacing of 500m and located within 25m of a maintenance hole on the sewerage system?		
Are hydrants on mains DN250mm and larger valve controlled hydrants?		
Are chlorination assemblies shown for mains DN225mm and larger?		
Are swabbing details shown on the drawings?		
Property Services		
Do property services comply with standards?		
Do property services crossing retaining walls comply with the standards?		
Drawings		
Is a locality plan provided?		
Are proposed subdivisions shown and correct? Are tentative subdivisions shown dashed?		
Is the drawing scale satisfactory? (normally 1:500)		
Is a north point shown on the drawings?		
Are street names and lot/house numbers clear?		
Are waterways, railway, reserves and schools labelled?		
Are long sections provided for mains DN300mm and larger?		
Is a works/materials schedule provided?		
Is a thrust block schedule provided?		
Is a hydrant and washout schedule provided?		
Are offsets clearly shown?		
Are details of nearby utility services shown?		
Are sizes and materials of existing mains shown?		
Are property connections shown?		
Are fire services labelled appropriately and drawn differently to WW mains?		
Are trenchless requirements shown?		

Appendix B – Non-Drinking Water Design Checklist

Criteria	Complete	Comments
Has solid purple pipe been used for all non-drinking water reticulation mains and property connections?		
If purple sleeving is to be used has the location been noted and/or details provided on the drawing?		
Has the correct labelling been used on all recycled water pipes, marker tapes and surface covers?		
Has purple detectable marker tape been installed over all recycled water reticulated mains and property service connections?		
Are all recycled water buried valves and fittings that form property service connections coloured purple?		
Are property service connections located as close as possible to the centre of the lot being serviced?		
Are all surface covers for drinking water square?		
Are all surface covers for non-drinking water round, coloured purple and marked 'recycled water'?		
Are recycled water hydrant marker posts coloured purple with a red top?		
Are non-drinking water scours provided at maximum spacing of 500m and located within 25m of a maintenance hole on the sewerage system?		