

## 9.2 Appendix 2

# Design Standards And Approving Developer Designs

### 9.2.1 Water Supply Design Standard

#### Supplementary Information to the WSAA Water Supply Code of Australia

#### WSA 03-2011 – 3.1 Melbourne Retail Water Agencies Edition Version 2

Adopted: July 2018.

#### 1.1 Westernport Water's Water Design Standards

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 Westernport 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 Westernport Water prior to proceeding.

#### 1.2 Changes to this document

Westernport Water may change or replace any part of this Design Standard at any time. The latest version of this document can be obtained from Westernport Water by downloading a copy from our website [www.westernportwater.com.au](http://www.westernportwater.com.au).

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Enquiries or suggestions relating to the information set out in this Design Standard are welcome and can be directed via email to [westport@westernportwater.com.au](mailto:westport@westernportwater.com.au).

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

#### 1.3 Legal and regulatory framework

Westernport Region Water Corporation (Westernport Water) is a statutory authority with water supply and sewerage responsibilities conferred on it by the *Water Act 1989* (VIC), including by Parts 7 - General Powers, 8 - Water Supply and 14 - Enforcement of the Act.

Section 160 of the *Water Act 1989* (VIC) empowers Westernport Water to make by-laws in respect to the management, protection and use of all lands, waterways and works under its management and control, including penalties and enforcement procedures for non-compliances.

A person who fails to comply with or do anything required to be done under the *Water Act 1989* (VIC), Regulation or By-Law, is guilty of an offence and risks prosecution by the Authority.



## Part 1: Planning and Design

### 1. GENERAL

#### Planning and Design Requirement

The concept plan shall include a Basis of Design Report that provides:

- Options considered for meeting requirements of the WSAA Code and Westernport Water;
- Justifications for necessary exceptions to requirements of the WSAA Code and this Supplement;
- Where a development is part of a longer-term multi-stage development, how the proposed infrastructure will meet the requirements of the full development and Westernport Water's Infrastructure Servicing Plan.

### 2. SYSTEM PLANNING

No amendments.

### 3. HYDRAULIC DESIGN

No amendments.

### 4. PRODUCTS AND MATERIALS

#### 4.1 General

Pipe and other associated products used on Westernport Water pipelines shall be approved Westernport Water products and materials. Written approval from Westernport Water must be obtained for any alternative pipe materials prior to their proposed use.

The below table summarises Westernport Water's preferred material and class for the different pipe diameters:

Diameter	Material	Minimum Pipe Class
63mm	HDPE (in court bowls only)	PN16
100-300mm	PVC-M/HDPE	PN16
>300mm	MSCL	PN16 or greater

#### 4.2 Differentiation of Drinking and Non-Drinking Pipe Systems

##### 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 to pre-tapped connections.

Pre-tapped connections are not permitted.

For PVC pipe – Gunmetal Tapping Band

For HDPE pipe – Gunmetal Tapping Band

Additional requirement:

PVC-O is not permitted for use within Westernport Water's region.

#### 4.7 GRP Pipeline Systems

Additional requirement:

Written approval from Westernport 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 clause and replace with the following:

Precautions must be made to prevent contact between dissimilar materials due to potential corrosion issues.

All underground metal pipeline components including stainless steel and galvanised bolts, nuts, washers, flanges, backing flanges gibaults, tapping saddles and isolation valves on service connections on water mains shall be protected and wrapped as per the details in WRWA-W-306A -Flange Arrangements.

### 5. GENERAL DESIGN

#### 5.4 Location of Water Mains

##### 5.4.2.2 Location in footway

Additional requirement:

Where possible, water mains should be laid at a standard offset of 2.1m from the property boundary.

##### 5.4.5 Dual water supply systems

Additional requirement:

The location of dual water supply systems is to be in a shared trench in the footway. Minimum 500mm clearance between drinking water and non-drinking water pipes to be maintained.

## 5.10 Termination Points

### 5.10.2 Temporary ends of water mains

*Additional requirement:*

Where the main is to be extended in the future, an in-line valve shall be provided at a suitable location approximately 18m from the end of the main.

Temporary or permanent ends of water mains  $\geq$  DN100mm with flushing/washout bends shall be terminated with 90 degree "duck foot" bends with minimum DN100mm hydrants. Hydrant Tees shall not be used for terminating mains. Concrete thrust restraints shall be used.

## 5.11 Property Services

### 5.11.2 Connection to water mains

*Additional requirement:*

The decision on whether a 300mm or larger main can be used as a tapping main is at the sole discretion of Westernport Water. As a guide, a 300mm or larger diameter main can be used as a tapping main, at Westernport Water's discretion, if:

- It is constantly under pressure and is not designed as a slow transfer main or a high pressure rising main;
- It has spare capacity to cater for the instantaneous demand created by the proposed tappings and the tappings will not compromise the primary function of the pipeline;
- Residential tapping bands and the pipe material/diameter are compatible;
- The pressure is not too high to allow to safely provide supply to residential houses;
- Water quality can be guaranteed from the pipeline, that is, residential chlorine levels will not be too high or too low; and
- There is no alternative network grid to supply individual properties.

*Replace 2nd last paragraph with the following:*

Property service connections shall be located so as to provide at least 1000mm spacing between connections (tapping bands and saddles) and/or pipe joints.

### 5.11.3 Services, outlets and meters

*Additional requirement:*

The installation of pre-tapped collars or connectors is not permitted.

Tappings shall be installed using a gunmetal tapping band and TPFNR fittings at the reticulation main. Single bolt tapping bands shall not be used. Minimum two (2) bolts are required.

Property services shall terminate with a buried ball valve with PE high pressure connection fitting and protection cover. The buried ball valve and cover must be located between 300mm and 500mm inside the allotment boundary. The cover over the buried ball valve and cover within the property shall be no more than 600mm from the finished surface level unless otherwise approved by Westernport Water. Scoria is not permitted to be used for embedment around the tapping and valves.

PE property services shall include detectable marking tape over the property service. Marking tape shall also be provided to the surface at all ferrules and ball valves.

The ferrule and ball valve on all property services 32mm and larger shall be brought to the surface and provided with a Fitzroy Box or other approved surface cover.

Drinking and non-drinking water property services shall not be in the same conduit together. The property services shall be located at the centre of each lot unless there is a conflict with proposed or existing driveways and/or other services.

In addition to section 5.8, where tappings cannot be aligned at 90 degrees to the kerbs, written approval from Westernport Water must be obtained for any alternate tapping arrangement. The guideline below should be followed when considering alternate tapping arrangements:

- At the time of water main design, allocate left-hand side of the property for crossovers/driveways. This allows the 4m wide 'no use' strip on the right hand side to be used for water tapping in cases where the 90 degree tapping is unable to be positioned elsewhere along the property frontage.
- If permitted by Westernport Water, diagonal crossings will need to have markings on the kerbs and on the footpath directly above the connection to the main. The markings are to be saw-cut and painted with reflective paint.

## 5.12 Obstructions and Clearances

### 5.12.5.1 General

*Replace entire section with the following:*

Details of underground services shall be obtained from the relevant Owner/Developer.

Operating in all states and territories, Dial Before You Dig (DBYD) is a one-stop service for those needing to identify owners and obtain plans of underground assets in the vicinity of a proposed dig site (visit [www.1100.com.au](http://www.1100.com.au) or telephone 1100).

Underground services and other obstructions such as power conduits/cables, gas mains, drains, telecommunications conduit/cables, oil/petrochemical pipelines and the underground portions of surface obstructions (tree roots, pits, etc) may affect the proposed alignment of the water main both in plan and level.

Where an existing service is indicated as being located within five (5) times the minimum clearance of the proposed water asset, the location of this service shall be investigated at the design stage. Where the existing service would have a medium impact on the horizontal or vertical alignment of the new water main (based on the size and normal depth of both services, site features, potential congestion of services and other factors), the exact location and depth of the underground obstruction(s) should be confirmed as follows:

- Through field survey and hand excavation (pot holing) when in (or partially in) unpaved ground; or
- Through field survey and where practicable electronic detection when under paved surface(s). In these instances, the service location shall be proven by hand at the time of water main construction. This requirement shall be indicated in the Design Drawings. If, at the time, the location of the service is found to be closer to the proposed water asset than the minimum clearance, the contractor shall notify the design consultant who shall notify the Westernport Water and make appropriate changes to the design.

Where a water main crosses other services, the depth of those services shall be determined as part of the design. Services outside the project area may also affect the layout of water mains.

### 5.12.5.2 Clearance requirements

The minimum horizontal clearance to any service is 350mm. Replace entire Table 5.6 with the following:

Utility (Existing or proposed service)	Minimum horizontal clearance (mm)		Minimum vertical clearance <sup>1</sup> (mm)
	New main size ≤DN 200	New main size >DN 200	
Water mains <sup>2</sup> >DN375	350	600	300
Water mains ≤DN375	350	600	150
Gas mains	350	600	150
Telecommunication conduits and cables	300 <sup>3</sup>	600	150
Electricity conduits and cables	500	1000	225 <sup>7</sup>
Stormwater drains	300 <sup>3</sup>	600	150 <sup>4</sup>
Sewers – gravity	1000 <sup>5</sup> /600	1000 <sup>5</sup> /600	500 <sup>4</sup>
Kerbs	300 <sup>6</sup>	300 <sup>6</sup>	Refer MRWA-W-202 (ie min cover)

#### NOTES:

- Vertical clearances apply where water mains cross one another and other utility services, except in the case of sewers where a vertical separation shall always be maintained, even when the main and sewer are parallel. The main should always be located above the sewer to minimise the possibility of backflow contamination in the event of a main break.
- Includes mains supplying drinking water and non-drinking water.
- Clearances can be further reduced to 150mm for distances up to 2m where mains are to be laid past installations such as concrete bases for poles, pits and small structures, providing the structure will not be destabilised in the process. The clearance from timber poles should be at least 200mm and preferably 300mm.
- Water mains should always cross over sewers and stormwater drains. For cases where there is no alternative and the main must cross under the sewer, the design shall comply with Details A and B of Drawing MRWA-W-203.
- Where a parallel sewer is at the minimum vertical clearance lower than the water main (500mm), maintain a minimum horizontal clearance of 1000mm. This minimum horizontal clearance can be progressively reduced to 600mm as the vertical clearance is increased to 750mm.
- Clearance from kerbs shall be measured from the nearest point of the kerb.
- An additional clearance from high voltage electrical installations should be maintained above the conduits or cables to allow for a protective barrier and marking to be provided.

## 6. SYSTEM PRESSURE MANAGEMENT

No amendments.

## 7. STRUCTURAL DESIGN

No amendments.

## 8. APPURTENANCES

### 8.2.3 Stop valves for transfer/distribution mains

Add the following row to Table 8.5:

Resilient Seated Gate Valves	Resilient Seated Gate Valves with Integrated Bypass	Metal Wedge Gate Valves	Butterfly Valves
Buried valves ≤DN300mm	Valve >DN300mm Where space is insufficient for flanged bypass valve plus hydrants	Not used	Above ground valves and valves >DN300

## 9. DESIGN REVIEW AND DRAWINGS

### 9.1 Design Review

New paragraph:

Once the design has been completed, Design Drawings shall be submitted to Westernport Water for auditing purposes, accompanied by Westernport Water's Design Checklist - Water which shall be completed by the designer. In general, Westernport Water will audit designs in the order they are received. It is Westernport Water's expectation that all designs submitted for auditing will comply with Westernport Water's design standards and will match the information provided in the accompanying Design Checklist - Water. Where discrepancies are found, the designer will be expected to revise the design drawings and checklist and submit them for re-auditing.

### 9.2.2 Composition of Design Drawings

Replace (a) with:

A notes and locality plan front sheet based on Westernport Water's template. This template shall be completed (ie filled in) to form Page 1. This template is available from Westernport Water in AutoCAD and pdf format. The text in blue provides instruction on what parts of the template need to be completed. The text in magenta provides an example design to illustrate how the drawing sheet might look once complete. The magenta text and any irrelevant information shall be deleted.

The Designer shall carefully edit all text on the sheet to ensure its relevance to the project. Any job specific requirements outside of those already included in the template shall be added.

All of the footer details shall be correctly filled in to include the names (including full surname) of those involved and the dates when key milestones were achieved. The person nominated to have checked the drawing shall be an Accredited Consultant with the Westernport Water.

Replace (a), (b) and (c) with:

Design Drawings generally shall include the following:

- a. A locality plan giving the overall layout and location of the works. If the works are a part of a staged subdivision, an updated locality plan with all stages must be provided.
- b. Key notes and schedules based on Westernport Water's Template.
- c. A detailed plan of the stage of development.

## Part 2: Construction

### 10. GENERAL

*No amendments.*

### 11. GENERAL CONSTRUCTION

*No amendments.*

### 12. PRODUCTS AND MATERIALS

#### 12.1.1 General

*New paragraph:*

Pipe and other associated products used on Westernport Water's water works shall be approved Westernport Water products and materials. Written approval from Westernport Water must be obtained for any alternative pipe materials prior to their proposed use.

### 13. EXCAVATION

*No amendments.*

### 14. BEDDING FOR PIPES

*No amendments.*

### 15. PIPE LAYING, JOINTING AND CONNECTING

*No amendments.*

### 16. PIPE EMBEDMENT AND SUPPORT

*No amendments.*

### 17. FILL

#### 17.1.3 Compaction of trench fill

*New sentence:*

Flooding or jetting of fill materials in excavation is not permitted under any circumstances.

### 18. SWABBING

*No amendments.*

### 19. ACCEPTANCE TESTING

The following tests are to be undertaken in order on all water mains and structures:

#### 19.1

1. **Visual inspection:** A visual examination of all water mains and component markers ensuring that the pipeline assembly is as specified and contains materials approved by Westernport Water
2. **Compaction testing (open trench construction only):** Field testing of controlled fill, pipe embedment, trench fill and embankments
3. **Hydrostatic pressure testing:** Raise pressure up to a test pressure to 1250kPa
4. **Water quality testing:** Water quality testing on all new mains following swabbing/flushing and pressure testing
5. **Special testing:** Block testing dual water supply systems to ensure that there are no cross connections

### 20. DISINFECTION

Main disinfection is to be undertaken after the hydrostatic pressure testing as per Westernport Water's approved method.

### 21. TOLERANCES ON AS-CONTRACTED WORK

As per Westernport Water "As Constructed Design Certification (ACDC) guide".

### 22. CONNECTION TO EXISTING WATER MAINS

*No amendments.*

### 23. RESTORATION

*No amendments.*

### 24. WORK AS CONSTRUCTED DETAIL

As per Westernport Water "As Constructed Design Certification (ACDC) guide".

## MRWA Water Supply Standard Drawings

### MRWA-W-103 Pipe and Joint Requirements

Table 103-D & 103-F

Amendment to Table 103-D:

Electrofusion jointing of PE shall only be undertaken where prior Westernport Water approval has been granted.

Amendment to Table 103-F:

- PVC-O is not an approved product for use within Westernport Water's service area;
- Use of GRP by Westernport Water approval only.

Pipe Size/Ground Condition		Normal Conditions	Contaminated Ground	Urban Centre or High Risk
DN<375 Pipework	Weak Ground (ie AHBP <50kPa)	PE or Restrained Joint DI	Restrained Joint DI	PE, Restrained Joint DI or Welded MS
	Normal Ground (ie AHBP >50kPa)	PVC-M or PE	DI	
DN≥375 Pipework	Weak Ground (ie AHBP <50kPa)	PE, Restrained Joint DI or Welded MS	Restrained Joint DI or Welded MS	PE or Welded MS
	Normal Ground (ie AHBP >50kPa)	PE, Restrained Joint DI or Welded MS	DI or Welded MS	

### MRWA-W-105 Distribution Main Divide Valve and Bypass

Amendment to NOTES Regarding Valves:

Delete Notes E and F (these only apply to Yarra Valley Water)

Amendment to Table 105-B:

Water Authority	DN≤450 Divide Valves	DN>450 to DN≤600 Divide Valves	DN>600 Divide Valves
Westernport Water	Resilient seated gate valve	Resilient seated gate valve (bypass as per Table 105-A)	Geared butterfly valve

Amendment to GENERAL NOTES:

Replace Note 5 with the following:

5. Direct property service connections are not permitted on mains ≥DN300 unless otherwise approved by Westernport Water.



### **MRWA-W-107 Installation of DN40PE, DN50PE & DN63PE Offtakes**

Delete Figure 107-A and 107-B- not used by Westernport Water.

Additions to Figures 107-D and 107-E:

- Tapping bands shall be gunmetal.
- Single bolt tapping bands are only permitted on mains DN $\leq$ 150.
- Ferrule shall be TPFNR type.

### **MRWA-W-108 Dead End Polyethylene Reticulation in Residential Areas**

Westernport Water generally adopts Figure 108-A and Figure 108-B for drinking water only and Figure 108-E and Figure 108-F for dual water; except that DN50 PE is not used (ie all sub-mains shall be DN63PE and limited to a length of 100m and 10 connections). 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. Westernport 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-W-109 Polyethylene Reticulation Details**

Delete Figure 109-E- not used by Westernport Water.

### **MRWA-W-110 Residential Property Service Arrangements**

Amendments:

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

### **MRWA-W-111 Installation of DN25 and DN32 Offtakes**

Delete Figure 111-A- not used by Westernport Water.

Additions to Figures 107-D and 107-E:

- Tapping bands shall be gunmetal.
- Single bolt tapping bands are only permitted on mains DN $\leq$ 150.
- Ferrule shall be TPFNR type.

Amendments:

- 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.

### **MRWA-W-202 Trenchfill**

No Amendments.

### **MRWA-W-212 Curves and Deflections (Vertical and Horizontal)**

Additions to Option 6:

The use of double socket connectors is not preferred by Westernport Water.

Additions to Option 6:

The use of PE is subject to approval of Westernport Water.

### **MRWA-W-300A**

Amendments to Table 300-B:

For DN $\leq$ 150, Westernport Water adopts shut-off blocks to a maximum of 25 properties.

### **MRWA-W-304 Hydrant and Air Valve Arrangements**

Refer to table 304-A.

### **MRWA-W-305 Hydrant and Air Valve Fitting Details**

Delete Figure 305-C and 305-F - not used by Westernport Water.

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

### **MRWA-W-306A Flange Arrangements**

Delete General Note E.

Amendments to Detail D applicability:

All stainless steel fasteners shall be protected as shown in Detail D unless Detail A or B apply.

## Design Checklist – Water

All relevant clause references are to MRWA WSA 03-2011-3.1 Version 2.0 and MRWA Standard Water Drawings

Subdivision	Stage	Checked By	Date

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>LOCALITY PLAN</b>			
1. Is a locality plan provided?			
2. Is a North point shown on the drawings?			
3. Are drawing revisions noted and dated, who has designed, drawn and approved them?			
4. Is Westernport Water's logo on the design plans?			
<b>NOTES</b>			
5. Do all notes refer to MRWA Water Standard Drawings or MRWA version of WSA 03-2011-3.1?			Check Recent WSA code
6. Do all notes refer to Westernport Water?			
7. Is the Australian height datum (AHD) noted on the design plans?			
8. Are the Australian Map Grid (AMG)/Geocentric Datum of Australia (GDA) noted on the design plans?			
9. Is the design head shown on the drawings and is it correct?			
10. Notes for Surveying and Asset Recording			
11. Notes for Products and Materials			
12. Notes for Appurtenances (fittings)			AVK Valves and wrap all cast iron fittings
13. Notes for Water Main Alignment, Trenching and Cover			
14. Notes for Embedment	MRWA-W-203		
15. Notes for Backfill	MRWA-W-201		
16. Notes for Thrust Restraint	15.7 WSA 03-2011-3.1		
17. Notes for Property Services			
18. Notes for Connections			
19. Notes for Other Services			
20. Notes for Earthworks and Retaining Walls			

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
21. Notes for Testing, Asset Acceptance and Live Connections			
22. Are Cultural Heritage notes required?			Not applicable
23. Notes referring to when Westernport Water needs to be contacted?			Hold points
<b>SCHEDULES</b>			
24. TBM Table - Are PBMs and/or TBMs shown on design plans and are AMG/GDA co-ordinates for these PBMs/TBMs shown on design plan?			Acronyms schedule
25. New Pipe schedule - Check size, material (PVC-M & PN16) or (PE100 & PN16), jointing method, etc <i>Note: Westernport Water does not accept PVC-O</i>			
26. Hydrant & Washout Schedule	MRWA-W-303		
27. Curved Pipe & Deflection Schedule	MRWA-W-212		
28. Service Alignment, Offsets & Clearances Schedule	5.12.5 WSA 03-2011-3.1		
29. Thrust Restraint Schedule	15.7 WSA 03-2011-3.1		
<b>DETAIL PLAN</b>			
30. Are all streets named and are all lots numbered?			
31. Does detailed plan have contours?			
32. Is a North point, legend & scale (A1 1:500) shown on the drawings?			
33. Are all existing utilities, materials and size shown and marked (EX)?			
34. Are proposed stormwater, paths, crossovers, roads & sewer shown?			
35. Are water main diameters and materials shown and comply with Westernport Water's requirements/standards?			
36. Is detectable marker tape specified for all mains?			
37. Are all mains located outside of private property?			
38. Do mains extend to the limits of the subdivision?			
39. Are all properties provided with a property service for both Drinking Water (DW) and Non-Drinking Water (NDW)?			

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>DETAIL PLAN (continued)</b>			
40. Has solid purple pipe been used for all NDW reticulation mains, property connections and valves?			
41. Are all property service offsets to property boundaries shown? (centre of block is preferred)			
42. Property connections must not be tapped within 1m of each other			
43. Property services must not be located under proposed driveways			
44. Are cul-de-sac/court bowl designs in accordance with standards?	Table 5.1 WSA 03-2011-3.1		
45. Is minimum cover achieved for specific locations?			
46. Are trenchless requirements shown?	MRWA-W-213		
47. If bored road crossings are used, is continuous pipe or single pipe joint used? (butt welded HDPE is preferred)			
48. Are all road, creek and railway crossings perpendicular? Are all special crossings shown in detail?	MRWA-W-210		
49. Are adequate details of connections to existing mains shown?			
50. Are detailed drawings of connections shown for connections of dissimilar material pipes?			
51. Are details provided on how redundant pipelines are to be decommissioned?			
52. 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?			
53. Are all bends noted and to standard?			
54. Are correct thrust restraints shown where required?  Are thrust restraints for dual water systems sufficient?	MRWA-W-204 MRWA-W-205A MRWA-W-205B MRWA-W-205C		15.7 WSA 03-2011-3.1
55. Are bulkheads or trenchstops required? (Mains <5% slope do not typically require bulkheads or trenchstops)	MRWA-W-208 MRWA-W-209		
56. Are valves located appropriately? Westernport Water shut off blocks are limited to 25 blocks.	Westernport Water Standard		

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
57. Are hydrants located at high and low points and with firefighting spacing requirements (maximum 200m between hydrants)?			
58. Is at least one (1) hydrant located within each shut off block? Are there sufficient hydrants and air valves to enable charging of new main?			
59. Are all non-drinking water scour valves provided at a maximum spacing of 500m and located within 50m of a maintenance hole on the sewerage system?			
60. Are hydrants on mains DN300 and larger valve controlled hydrants?			
61. Are longitudinal section details provided for mains DN300 and larger?			
62. Are swabbing entry and exit details shown on drawings?	MRWA-W-308		
<b>OTHER</b>			
63. Has the whole catchment (required to be controlled through this development) been controlled?			
64. Are mains of adequate size to serve current and future subdivisions?			
65. Does minimum residential service pressure exceed 15m?	Table 2.3 WSA 03-2011 3.1		
66. Does minimum commercial/industrial service pressure exceed 20m?			
67. Has a Dial Before You Dig (DBYD) search been carried out?			
68. Are there any works proposed within a VicRoads declared road?			
69. Is cathodic protection used where required?	4.8.5 WSA 03-2011-3.1		
70. Do flanged joints have appropriate insulation?	MRWA-W-306A		
71. Are the correct type of conduits and sleeving used?			
72. Is the valve closing direction clearly shown on drawings? (anti-clockwise close)			
73. Has the designer integrated hazard identification and risk assessment methods to eliminate the risk of injury throughout the life of the system?			

## 9.2.2 Sewer Design Standard

### Supplementary Information to the WSAA Sewer Supply Code of Australia

#### WSA 02-2014 – 3.1 Melbourne Retail Water Agencies Edition Version 2

Adopted: February 2019

## Introduction

### 1.1 Sewer Design Guide

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### 1. GENERAL

*No amendments.*

### 2. SYSTEM PLANNING

The concept plan shall include a Basis of Design Report that provides:

1. Options considered for meeting requirements of the WSAA Code and Westernport Water;
2. Justifications for necessary exceptions to requirements of the WSAA Code and this Supplement;
3. Where a development is part of a longer-term multi-stage development, how the proposed infrastructure will meet the requirements of the full development and Westernport Water's Infrastructure Servicing Plan

### 3. HYDRAULIC DESIGN

*No amendments.*

## 4. PRODUCTS AND MATERIALS

### 4.1 General

Pipe and other associated products used on Westernport Water sewerage works shall be approved Westernport Water products and materials. Written approval from Westernport Water must be obtained for any alternative pipe materials prior to their proposed use.

Pipe Jointing materials for Gravity Sewer System:

Diameter	Material	Areas
100mm	PVC - Solvent Cement <i>NB: Not permitted other than for house connection branches.</i>	All Residential areas
>150mm	PVC - Rubber ring jointed	All Residential areas
225mm and larger	Rubber ring jointed PVC, cement solvent when required or other types of materials to be approved by Westernport Water	Industrial areas.

## 5. DETAILED DESIGN

MAXIMUM AND MINIMUM ET FOR GRAVITY SEWERS FOR VARIOUS LOCATIONS (Table 5.6) - Maximum grades as per MWRW-S-205

### 5.2.4.2 Sewers located along front or side boundaries

*New sentence:*

Where sewers are required at the front of the allotments, the sewer must be laid in a road reserve and not within private property.

### 5.3.8 Horizontal curves in sewers

*New sentence:*

Approval for all horizontal curves and sweep bends must be obtained from Westernport Water. Details of curves and sweep bends must be shown in design drawings.

## 6. PROPERTY CONNECTIONS

### 6.3 Methods of the Property Connection

#### 6.3.1 General

*New sentence:*

Where a property connection is required close to a maintenance hole, it is preferred for the property connection to be connected directly to the maintenance hole, where possible.

#### 6.3.3 Buried interface method

*New sentence:*

Westernport Water requires type 4A property connections on all properties as per MRWA-S-304 unless otherwise approved.

## 7. MAINTENANCE STRUCTURES

### 7.1 Types of Maintenance Structures

*New sentence:*

Westernport Water does not allow the use of maintenance shafts, except as a TMS.

### 7.2 Locations of Maintenance Structures

*New table:* MRWA-S-300 Table 300-A:

Application	Acceptable Options		
	MH	MC	TMS/IS
Change of grade	YES	YES	NO
Change in horizontal direction	YES	NO – subject to Westernport Water approval	NO
Permanent end of a reticulation sewer	YES	NO	YES – only if a MH is within 45m downstream of TMS/IS
Straight sections of sewer between MHs	YES	YES	NO
Droppers	YES	YES	YES

### 7.3 Spacing of Maintenance Structures

#### 7.3.2 Maintenance structure spacing - Reticulation sewers

Replace with:

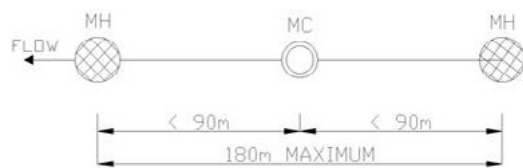
For reticulation sewers, the maximum distance between any two consecutive maintenance structures shall be 90m and subject to the provisions of Clause 7.3.1.

The following table replaces MRWA Table 7.1:

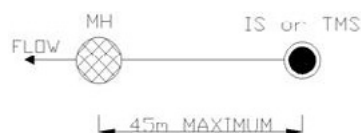
Upstream Structure	Downstream Structure	Land Type	Maximum Separation
TMS or IS	MH*	Private Property	45m
TMS or IS	MH*	Public Land	45m
MC	MH	Private Property	90m
MC	MH	Public Land	90m
MH	MC or MH	Private Property	90m
MH	MC or MH	Public Land	90m

\*Westernport Water requires a Maintenance Hole (MH) to be located within 45 metres downstream of the permanent end of a reticulation sewer.

Replace Figure 7.1 with:



Replace Figure 7.4 with:



#### 7.3.3 Maintenance structure spacing - Branch and trunk sewers

New sentence:

Only MHs shall be used for sewers of sizes  $\geq$ DN375. The maximum distance between any two (2) branch or trunk sewer MHs shall be 90m.

### 7.6 Maintenance Holes (MH)

#### 7.6.2 Types of MH construction

New paragraph:

Standard MH construction shall be poured in situ comprising a poured base, channels and walls, with a poured concrete cover slab. Precast MHs must not be used unless written approval is obtained from Westernport Water. Such approvals will only be granted in exceptional circumstances.

Special MH construction may be permitted by Westernport Water. These include using other corrosion resistant materials such as PVC either as formwork or as a corrosion barrier, in conjunction with non-standard construction techniques that may offer lower life cycle costs.

MHs may also be constructed from PE and other plastic materials provided that an approved product is used.

#### 7.6.9 Ladders, step irons and landings

New paragraph:

Step irons and ladders shall be located directly over the downstream MH base channel within 1050mm and 1200mm diameter MHs with the cone of the maintenance MH pointing upstream. In MHs larger than 1200mm diameter, the step irons and ladders shall not be located over the MH base channel and shall be located with an unobstructed area immediately in front of the step irons or ladder as per Clause 7.6.8.

### 7.7 Maintenance Shafts (MS)/ Maintenance Chambers (MC)

New paragraph:

Westernport Water does not allow the use of maintenance shafts, except as a TMS. Delete all references to the use of MSs (except at TMSs) in the entire Section 7.7.

Westernport Water permits the use of PP MCs. Approval must be gained by Westernport Water for the use of alternative MC materials.



### 7.7.3 Connections to MC and MS

*New sentence:*

Westernport Water only permits reticulation and property sewer connections to MC and MS by a direct inlet via a formed channel through the bench.

### 7.8 Inspection Shafts (IS)

*New paragraph:*

Inspection shafts (IS) are generally an acceptable alternative to TMSs for sewers  $\leq$ DN225. ISs shall only be used at the design locations detailed in Table 7.1. Where ISs are installed at the termination of reticulation sewers, ie for branches less than 45 metres in length, the IS shall be constructed upstream of all property connection branches.

IS types include:

- a. Terminal (Type A) – used in conjunction with a property connection immediately downstream.
- b. Vertical drop (Type B) – Vertical drop inspection shaft.
- c. Intermediate (Type C) – not used by Westernport Water.

### 7.9 Maintenance Structure Covers

*New paragraph:*

MS covers are to be circular gatic type which are opened with the standard gatic lifter and have a concrete infill.

## 8. ANCILLIARY STRUCTURES

*No amendments.*

## 9. STRUCTURAL DESIGN

*No amendments.*

## 10. DESIGN REVIEW AND DRAWINGS

### 10.1 Design Review

Westernport Water requires the Design Checklist - Sewerage to be completed and submitted along with the design drawings for auditing purposes.

*New paragraph:*

Once the design has been completed, design drawings shall be submitted to Westernport Water for auditing purposes, accompanied by Westernport Water's Design Checklist - Sewerage which shall be completed by the designer. In general, Westernport Water will audit designs in the order they are received. It is Westernport Water's expectation that all designs submitted for auditing will comply with Westernport Water's design standards and will match the information provided in the accompanying Design Checklist - Sewerage. Where discrepancies are found, the designer will be expected to revise the design drawings and/or checklist and submit them for re-auditing.

### 10.2 Design Drawings

#### 10.2.2 Composition of Design Drawings

*Replace with:*

A notes and locality plan front sheet based on Westernport Water's template. This template shall be completed (ie filled in) to form Page 1. This template is available from Westernport Water in AutoCAD and pdf format. The text in blue provides instruction on what parts of the template need to be completed. The text in magenta provides an example design to illustrate how the drawing sheet might look once complete. The magenta text and any irrelevant information shall be deleted.

The designer shall carefully edit all text on the sheet to ensure its relevance to the project. Any job specific requirements outside of those already included in the template shall be added.

All of the footer details shall be correctly filled in to include the names (including full surname) of those involved and the dates when key milestones were achieved. The person nominated to have checked the drawing shall be an Accredited Consultant with the Westernport Water.

Design Drawings shall include the following:

- a. A locality plan giving the overall layout and location of the works. If the works are a part of a staged subdivision, an updated locality plan with all stages must be provided.
- b. Key notes and schedules based on Westernport Water's Template.
- c. A detailed plan of the stage of development.
- d. Special details where Westernport Water's Standards are not sufficient.
- e. Longitudinal sections and further detailed components.

#### 10.2.6 Structures

*Additional items to be included on the Design Drawings:*

- (l) A base detail must be shown for MHs where there are three (3) or more incoming sewers, two (2) or more drops, angles of deflection greater than 90 degrees, unusual configurations of incoming sewers, or sewers are offset from the centre of the MH.
- (m) A base detail must be shown for any connections to existing MHs, unless connection is to an existing stub that will not need to be modified. The detail shall show the existing layout and the modifications that are required so that the minimum working spaces are maintained in the MH. It is expected that existing MHs will be inspected as part of the design to confirm that they are suitable for a new connection.

## Part 2: Construction

### 11. GENERAL

*No amendments.*

### 12. GENERAL CONSTRUCTION

*No amendments.*

### 13. PRODUCTS AND MATERIALS

*New paragraph:*

Pipe and other associated products used on Westernport Water sewerage works shall be approved Westernport Water products and materials. Written approval from Westernport Water must be obtained for any alternative pipe materials prior to their proposed use.

### 14. EXCAVATION

*No amendments.*

### 15. BEDDING FOR PIPES AND MAINTENANCE STRUCTURES

*No amendments.*

### 16. PIPE LAYING AND JOINTING

*New paragraph:*

Root resisting rubber rings shall be used for all PVC sewers greater than or equalled to 150mm diameter. Solvent cement jointing requires Westernport Water's approval. For all other pipe materials, joints should be as per the Manufacturer's recommendations.

#### 16.2 Horizontal and Vertical Deflection of Sewers

##### 16.2.3 Horizontal curves

*New sentence:*

All curved sewers shall be accurately surveyed and recorded on the As Constructed drawings, including offsets from property boundary, curve radius, and tangent points.

*Replace last sentence with:*

Westernport Water approval is required for the use of curves and sweep bends on all sewers.

##### 16.12 Bored Pipes Under Roads, Driveways and Elsewhere

*New sentence:*

Westernport Water will require all bored pipelines and sewer greater than DN225mm to be inspected by using CCTV camera.

### 17. MAINTENANCE HOLES (MH)

*No amendments.*

### 18. MAINTENANCE CHAMBERS (MC), MAINTENANCE SHAFTS (MS) AND INSPECTION SHAFTS (IS)

*No amendments.*

### 19. PIPE EMBEDMENT AND SUPPORT

*Additional requirement:*

Westernport Water prefers 5mm minus or 7mm minus for pipe embedment and maintenance structures.

### 20. FILL

#### 20.1.4 Compaction of trench fill

*New sentence:*

Flooding or jetting of fill materials in excavation is not permitted under any circumstances.

### 21. ACCEPTANCE TESTING

*Replace whole section with:*

Refer to MRWA Specification 13-01.1 (Sewer Acceptance Testing Specification. Westernport Water has adopted this specification).

### 22. TOLERANCES ON AS-CONTRACTED WORK

As per Westernport Water "As Constructed Design Certification (ACDC) guide".

### 23. CONNECTION TO EXISTING SEWERS

*No amendments.*

### 24. RESTORATION

*No amendments.*

### 25. WORK AS CONSTRUCTED DETAIL

Prepare Work As Constructed drawings and documentation to the requirements of the Westernport Water "As Constructed Design Certification (ACDC) guide".

## Design Checklist – Sewerage

For Westernport Water staff to validate design drawings

All relevant clause references are to MRWA WSA 02-2014-3.1 Version 2.0 and MRWA Standard Sewer Drawings

Development/Subdivision	Stage	Checked By	Date

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>LOCALITY PLAN</b>			
1. Is a locality plan provided?			
2. Is a north point shown on the drawings?			
3. Are drawing revisions noted and dated, who has designed, drawn and approved them?			
4. Is Westernport Water's logo on the design plans?			
<b>NOTES</b>			
5. Do all notes refer to MRWA Sewer Standard Drawings or MRWA version of WSA 02-2014-3.1?			
6. Do all notes refer to Westernport Water?			
7. Is the Australian height datum (AHD) noted on the design plans?			
8. Are the Australian Map Grid (AMG)/Geocentric Datum of Australia (GDA) noted on the design plans?			
9. Notes for Surveying and Asset Recording			
10. Notes for Property Connections	MRWA-S-301		
11. Notes for Earthworks			
12. Notes for Embedment	MRWA-S-202		
13. Notes for Backfill	MRWA-S-201		
14. Notes for Compaction Testing	MRWA Specification 13-01.1		
15. Notes for Working on Live Sewers			
16. Notes for Site Safety			
17. Notes for Acceptance Testing	MRWA Specification 13-01.1		
18. Notes for Environmental Management			
19. Notes for Cultural Heritage (if required)			
20. Notes referring to when Westernport Water needs to be contacted (Hold Points)?			

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>SCHEDULES</b>			
21. TBM Table - Are PBMs and/or TBMs shown on design plans and are AMG/GDA co-ordinates for these PBMs/TBMs shown?			
22. New Pipe Table - Check size, material (U PVC & SN8), jointing method			
23. Service Offsets Table	Table 5.4 MRWA WSA 02-2014-3.1		
24. Maintenance Structure Schedule - Check numbering, size (1050mm), that concrete is N32 and in situ, type is conical (flat top if in road or shallow IL<1.4m) and cover class to suit specific location	MRWA-S-300 MRWA-S-313		
<b>DETAIL PLAN</b>			
25. Are all streets named and are all lots numbered?			
26. Does the detailed plan have contours?			
27. Is a north point, legend and scale (A1 1:500) shown on the drawings?			
28. Are all existing utilities materials and size shown and marked (EX)?			
29. Are all maintenance structures named correctly in logical order?			
30. Do all maintenance structures have upstream and downstream IL marked? Is a minimum fall of 30mm across the structure achieved?			
31. Do locations of maintenance structures meet Westernport Water's location requirements? (ie TMS within 45m of a MH, maximum 90m spacing between MH and MC or no horizontal change of direction through MC)	Westernport Water Standards		
32. If area is subject to flooding, all maintenance structures must have bolt down covers			
33. Do all sewer mains have a minimum 1m clearance from confined all property boundaries and easements?	MRWA-S-110 MRWA-S-111		
34. Do all pipes have diameters and grades noted?	Table 5.6 MRWA WSA 02-2014-3.1		
35. Are there any Bulkheads if grades are steeper than 1 in 10?	MRWA-S-205		
36. Are there any grades flatter than 1 in 180 for 150mm diameter sewers?	Table 5.6 MRWA WSA 02-2014-3.1		

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
37. Are any sewers deeper than 5m? Check soil conditions for need of alternative pipe support.	9.9 MRWA WSA 02-2014-3.1		
38. Are there any curved sewers? If not, proceed to 40.			
39. Are all curved sewers designed correctly? (Minimum radius (24m for 150 PVC), jointing technique, no property connections, etc)	MRWA-S-104B		
40. Are all bends from structures noted and to standard?	MRWA-S-104B		
41. Do all sewers in private property have minimum required easements? <i>Note: Sewer alone is 2m.</i>	MRWA-S-111		
42. Are all sewers along the front of properties located within road reserve and not within the property unless otherwise approved by Westernport Water?			
43. Are all properties provided with a property branch/connection?	MRWA-S-301		
44. Are all property connections Type 4A unless otherwise approved by Westernport Water and noted on design plans with their IL and property boundary offset?	MRWA-S-304		
45. Property connections shall not extend beyond the property/easement boundary. If no easement property connection is to be a minimum of 300mm inside the serviced property.	MRWA-S-108 MRWA-S-109		
46. House branch connections at the rear of the property are to be located on the lowest/downstream corner of the lot at 1m from the side boundary.	Westernport Water Requirements		
47. Have future stages been considered in the construction of this stage? (eg extra HBCs, MH chases, etc)			
48. Are there any parts of the development with wet/poor ground condition? Has a geotechnical assessment been made?	9.6 MRWA WSA 02-2014-3.1		
49. Has an ERS been incorporated into the design?	MRWA-S-404		
50. Are there any crossings over Council drains? Has written approval of the design been obtained?			

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>LONGITUDINAL SECTIONS</b>			
51. Do all maintenance structures name, IL, grades etc match that of the detailed plan and schedules?			
52. Are structural computations of maintenance structures deeper than 6m provided?			
53. Is minimum 600mm cover achieved on all pipes?			
54. Is crushed rock backfill denoted under all footpaths and roadways/driveways?			
55. Are any property connection oblique junctions deeper than 4m?			
56. Are all property connections and ILs noted on longitudinal sections?			
57. Are base details provided for maintenance holes with: two (2) or more internal drops, three (3) or more incoming sewers, sewers offset from the centre of the MH, angle of deflection >90°?	MRWA-S-309 MRWA-S-311		

Criteria	Relevant Clause/ WSA Drawing	Complete	Comments
<b>OTHER</b>			
58. Has the whole catchment (required to be controlled through this development) been controlled?			
59. Has continuously jointed pipe been specified for creek crossings?			
60. Does the location of the rising main comply with Westernport Water requirements (eg terminates to a PE maintenance structure)?	Westernport Water Requirements		
61. Has a Dial Before You Dig (DBYD) search been carried out?			
62. Are there any works proposed within a VicRoads declared road?			
63. Has the requirement for odour control measures been assessed and incorporated into the design?			
64. Are landings, handgrips, ladders, etc in accordance with standards and correct materials specified?	MRWA-S-314		
65. Is the velocity through the pipe below 3m/s in both partial and full flow (or under pressure flow if pressure main)?	5.5.9 MRWA WSA 02-2014-3.1		
66. Have Hydraulic Grade Line (HGL) details been submitted ensuring that there is no possibility of overflow upstream at Manholes, property drains, etc?			
67. Has the designer integrated hazard identification and risk assessment methods to eliminate the risk of injury throughout the life of the system?			

