Barwon Water

Supplementary information to the WSAA Sewerage Code of Australia

Melbourne retail water agencies edition

Version 1.0 WSA 02-2002-2.3
For land development

Table of contents

NOTE: THE CLAUSE AND SECTION NUMBERS MATCH THOSE THAT ARE USED IN THE MELBOURNE RETAIL WATER AGENCIES VERSION OF THE WSAA SEWER RETICULATION CODE (WSA 02-2002-2.3)

Supporting documentation – Sewerage Code

Introduction

Barwon Water's design and constructions requirements for sewer mains required for the provision of services to subdivisions and other land development works is the *Water Services Association of Australia Sewerage Code of Australia WSA 02-2002-2.3 Retail Water Agencies Edition Version 1* with the exceptions listed in this supplement.

General

This supplementary documentation describes Barwon Water's specific requirements for sewerage works additional to those detailed in the *WSAA Sewerage Code of Australia WSA-02-2002-2.3 - Melbourne Retail Water Agencies Edition - Version 1*.

The Supplementary section of the Water Reticulation Code contains:

- Table of contents to the supplementary Documentation
- Description of Barwon Water requirements where required or different to the WSAA Code

Operation

The clause numbering of this supplementary document matches the WSAA Code.

Innovative solutions

WSAA Sewerage Code of Australia and this supporting documentation provide 'deemed-to-comply' solutions for the creation of all water agency sewerage assets. Alternative solutions, practices, equipment and methodologies will continue to evolve and offer opportunities to improve the creation of these assets. Barwon Water encourages use of any innovation that offers enhanced productivity and serviceability, but Barwon Water input should be sought before any new system is designed.

Responsibilities

Designers and constructors are responsible for their respective aspects of the design and construction process. It is the designer/constructor's responsibility to justify any variation from the requirements set out in the Sewerage Code of Australia (including the attached Barwon Water conditions) and/or the Barwon Water Construction Drawings - plus any specific directions given by Barwon Water for a particular project. The designer/constructor is to obtain Barwon Water endorsement for any variation.

Amendment history

Update number	Brief description	Effective date
2	1. Section 4.6.5.2 – Change minimum size of house connection branch from 100 mm to 150 mm 2. Section 5.4 – Added requirements for maintenance shafts at depths up to 6.0 metres 3. Section 6.1 – Changed reference to Barwon Water standard drawings only for maintenance shafts 4. Section 6.6.9 – added requirements for manhole cover surrounds in road pavements 5. Section 6.7 – Added type D requirement for maintenance structures 6. Section 9.3 – Updated confined space standard note for design drawings 7. Section 15.5.3 – Added requirement to purchase redundant/ disused sewers 8. Section 14 – Added SewerPro to the permitted pipe material list 9. Section 21 – Modified backfill requirement to include maintenance/ terminal maintenance shafts 10. Section 22.4.4.2 – Modification of test procedure involving o-rings and maintenance shaft caps 11. Section 26 – changed 'as constructed' Survey Manual reference as a result of the *Land Development Manual* review	June 2012
1	1. Separation of supplement from the *Land Development Manual* 2. Addition of Amendment History section and page breaks/sections 3. Insertion of preface and update of introduction to the code. 4. Changing of title of document from 'WSAA SEWERAGE CODE' to 'WSA SEWERAGE CODE OF AUSTRALIA - MELBOURNE RETAIL WATER AGENCIES EDITION – VERSION 1' 5. Change part 3 System Planning to 2 System planning (not a part) 6. Changing of 3.1 Sewerage system philosophy and definition to 2.1 7. Changing of 4.3.2 text from '(c) Sewer offset' to 'Roads, reserves and open spaces – (c) Sewer offset' 8. Changing of 4.6.3 text form 'Minimum cover' to "Minimum cover over sewers' 9. Adding of text "MRWA" before 4.6.5.2, 5.9 and 6.9 10. Changing of 5.2 text 'Connections' to 'connection' 11. Changing of content numbering 6.3.1 to 6.3 & 6.7.1 to 6.7 12. Changing of 6.6.2, 6.6.5, 7.3 and 7.3.2 from 'Manholes' to 'MHs' 13. Changing of heading 7 'Ancillary maintenance structures' to 'Ancillary Structures' 14. Addition of 8 to heading 'Structural design' 15. Addition of 9 to heading 'Design review and drawings' 16. Changing of 9.3.1 from 'scales' to 'scale' 17. Changing of 22.7 text from 'Closed circuit colour TV (CCTV) Inspection' to 'CCTV Inspection' 18. Text 'PART 3' added into heading for 'System planning'	June 2010

Part 1: Planning and design

2. System planning

2.1 Sewerage system philosophy and definition

2.1.4.2 Sewage pumping stations (SPS's)

Barwon Water does not support the 'other options.... e.g. vacuum sewerage and pressure sewerage systems'., Therefore, these types of systems may not be approved except in exceptional circumstances.

3. Flow estimation

3.2. Design flow estimation method

3.2.2 Traditional design flow estimation method

Sewer is designed for peak wet weather flows at two thirds full capacity.

Average dry weather flow	200 l/h/d	
Average peak wet weather flow	800 l/h/d	
Number of persons per tenement	3.5	
Multi-tenement development (residential)	1 unit = 0.65 House	
Maximum flow	150mm	2/3 cap. at P.W.W.F.
	225mm	"
	300mm	"

Calculations based on Kutter's formula, n = 0.013. (Equivalent to Mannings formula with 'n' = 0.014)

4. Detail design

4.2.5 Easements

Easements are to be in accordance with the *Land Tenure Guidelines* set out in section 3.2.3 (policy section) of Barwon Water's *Land Development Manual*.

4.3.2 Roads, reserves and Open Space - c) Sewer offset

Minimum offset of a sewer main within the front boundary of any lot to be 2.0 metres.

4.3.6. Dead ends

Addition to clause.
All sewer stubs for future connections shall be designed at the correct grade for future sewers.

4.3.7 Horizontal curves in sewer.

Pipe curvature may only be achieved by cumulative deflection at pipe joints. Design shall specify pipe proposed to be used. Manufacturer's recommended maximum joint deflection for those pipes shall be provided with the design.

4.5.4. Minimum pipe size for maintenance purposes.

Table 4.3 in code not to be used.
Refer to table shown in 4.5.5 below.

4.5.5. Maximum capacity for reticulation sewers

Table 4.4 not to be used

The table shown below is to be used to determine the sewer grades.

Allotment categories

For sewer design purposes, allotments are grouped into one of the following categories:

Category one

Normal residential allotments (allotment for a single dwelling).

Category two

Light industrial allotments, commercial sites and multiple residential sites up to six (6) flats or villa units.

Category three

Large industrial and commercial sites, hospitals, schools and multiple residential sites for more than six (6) flats or villa units. For the purpose of calculating loadings on the sewerage system, any allotment falling into categories 2 and 3 should be considered on an individual basis. For allotment categories 1 and 2 the permissible loading shall be as follows:

Note that loadings are taken from the upstream end of the sewer main.

a. 150 mm diameter

	Min	**Max**	
1 in 50	1	500	Houses
1 in 80	3	450	"
1 in 100	5	400	"
1 in 120	10	350	"
1 in 150	20	300	"
1 in 180	30	200	"

b. 225 mm diameter

	Min	**Max**	
1 in 50	60	1400	Houses
1 in 80	85	1200	"
1 in 100	100	1100	"
1 in 120	115	950	"
1 in 150	140	900	"
1 in 180	155	850	"
1 in 200	180	800	"
1 in 250	220	700	"
1 in 300	240	600	"

c. 300 mm diameter

	Min	Max	
1 in 80	100	3100	Houses
1 in 100	120	2800	"
1 in 120	140	2500	"
1 in 150	170	2300	"
1 in 180	225	1950	"
1 in 200	280	1750	"
1 in 250	335	1600	"
1 in 300	390	1500	"
1 in 400	450	1350	"

d. 375 mm and 450 mm diameter.

To be determined using engineering principles and approved by the Corporation.

4.6.3 Minimum Cover over sewers

Private residential property and public land not subject to vehicular loading – minimum cover 0.75 metres.

Other classes of cover as per table 4.8 of the WSAA Sewerage Code.

4.6.4.4 Partial Lot Service

Restriction to be placed on design drawings as well as plan of subdivision.

MRWA 4.6.5.2 Limitations on connections to sewers

House connections greater than DN150 are subject to Barwon Water approval.
Connections to sewer mains greater than DN300 are subject to Barwon Water approval.

4.6.8 Compound Curves

Not permitted

5. Property connection

5.2. Limitations of connections to sewers

Refer to note for 4.6.5.2 (above).

5.4 Maximum depth of property connections

Any connection > 4.0 metres is to be connected directly into a manhole or maintenance structure only. The depth of maintenance structures is limited to 6.0 metres.

Any connection to a maintenance structure is only where the shaft is 300 mm in diameter.

5.7. Y- Property connections

Not permitted.

5.8. Length of property connection sewers

The maximum length of any property connection sewer, regardless of the diameter, is 10 metres. No part of the property connection sewer is permitted under the road pavement.

MRWA 5.9. Types of property connections

Refer Barwon Water standard drawings listed in Part 4: Standard drawings

5.10. Retaining walls

Works in close proximity to retaining walls are to be designed in accordance with Barwon Water's Asset Protection policy and subsequent approval.

6. Maintenance structures

6.1 Types of maintenance structures

Barwon Water standard drawings only apply.

Refer to Part 4 of this supplement.

6.3 Spacing of maintenance structures

Table 6.1 – MS not allowed for change in grade at same level or for change in horizontal direction.

Maximum spacing between maintenance holes (MH) with intermediate MS is 150 m.

Maximum spacing between MH without intermediate MS is 100 m.

Maximum spacing between MH and intermediate MS is 100 m.

Maximum spacing between a MS/Terminal Maintenance Shaft (TMS) and any maintenance hole is 60 m at the end of line. Only one intermediate MS to be used between maintenance holes.

6.4 Special consideration for location of maintenance structures

Alternative maintenance holes
Barwon Water will permit the installation of "Alternative" maintenance structures in lieu of the conventional maintenance holes subject to the following conditions:

- Approved to a depth of 3 metres.
- Only one to be installed between conventional maintenance holes.
- On straight line through lines unless otherwise approved by Barwon Water.
- Only to be used on grades of 1 in 80 or flatter, unless otherwise approved by Barwon Water.

NOTE: These products may also be used at the end of lines.

6.6.2. Types of MH construction

(b) to be used only.

Construction to be in accordance with "Precast Concrete Access Chambers Installation Guide", available at Barwon Water's land development manual webpage.

Any access chamber base where the change in direction is greater than 45 degrees to the straight line is to be constructed with a straight through channel

6.6.5. Diameters of MH

Minimum manhole diameter shall be 1050 mm.
Where there are 2 or more internal drops use a 1500 mm diameter manhole.
Where a sewer is ≥DN300 a 1500 mm diameter manhole shall be used.
Where the sewer is deeper than 3.0 m, 1500 mm diameter manholes are to be used.
600 mm and 900 mm diameter manholes are not permitted for shallow sewers. Squat tops only to be used in conjunction with diameters as mentioned above.

6.6.8. Ladders, step irons and landings

Ladders and step irons are not to be provided in maintenance holes. Landings are to be designed in accordance with the WSAA Code.

6.6.9. MH covers

No concrete manhole covers are permitted. All manhole covers shall be gatic style B type for non trafficable areas; otherwise D type.

Where manhole covers are located within the road pavement, the concrete surround (vegetation ring) is to be removed and not used.

6.7 Maintenance Shafts (MS)

Second paragraph not applicable as all maintenance shafts are to be either on straight runs between manholes or at end of lines.

MS covers to be Type D in all locations.

MWRA 6.9. Sewers from junctions

Case A and B not allowed.

7. Ancillary structures

7.2.1 General Design Parameters

For customer sanitary drains change size from DN375 to DN300.

7.3. Water seals and gas check maintenance holes (MH)

7.3.2. Design parameters for water seals and gas check all MHs

Where a sewer connects to a sewer > DN300 then a gas check manhole will be required before that connection. All gas check manholes shall be precast only.

Where a house connection branch connects to a sewer ≥DN300 then a boundary trap will be required on the House Connection branch.

The type of gas check manhole permitted shall be as shown on drawing SEW-1411 or single gas check manhole supplied by Humes P/L. or approved equivalent (see Barwon Water drawing 70083A). The arrangement on SEW-1409-V is not acceptable.

7.6. Near horizontal boreholes

- Jacking of pipes shall be for VC pipe only.
- A CCTV report shall be submitted at the completion of the work.
- Installation of PVC pipe to be solvent cement only.
- PE pipe to be debeaded internally prior to commissioning of new main.

8. Structural design

8.8. Pipe cover

Drawing 1201v shall be used with minimum cover of 750mm to sewer.

8.10. Bulkheads and trenchstops

Concrete bulkheads shall be used where the grade of the sewer is equal to or steeper than 1 in 10. The grade of the pipe shall be equal to the longitudinal spacing of the concrete bulkheads - e.g. 1 in 8 grade gives a concrete bulkhead spacing of 8 metres.

Where the grade is steeper than 1 in 3.5, concrete bulkheads will be required on the same basis with continuous concrete encasing of the sewer.

Where the sewer is designed at a grade steeper than a 1 in 2, special design requirements may be imposed.

9. Design review and drawings

9.2 Design drawings

(t) Any other relevant information

- all allotments to be serviced
- street names
- Allotment and/or Street numbers
- Extent of work.
- Location of any existing other services
- Obstructions (re trees, structures etc).
- Symbols showing location of valves fire plugs and reducers etc.
- Pipe size and material
- Easements
- All storm water drains with details of size
- North point
- Scale
- Drawing number
- Drawing revision number
- One copy of each drawing is to be submitted along with road construction drawings, for checking and subsequent acceptance.

9.3 Drafting standards

The following tables shall be used instead of the MRWA standards.

Figure 9.1 below displays the legend, title block and other standard notes to be displayed on the design.

					H G
A	B	C	D	E	F

Figure 9.1 Layout sheet for designs

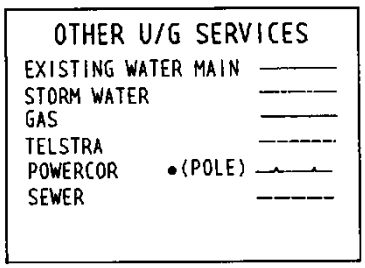
A)

1.	Construction of sewer and water mains to be in accordance with Barwon Water Standard Specifications 'Construction of Gravity Sewers and Rising Mains' and 'Construction of Water Mains'.
2.	Every effort must be made to ensure the locations of all existing services on the plan are correct. However, actual locations are to be checked on site before commencing excavations.
3.	Normal size of water mains indicated in millimetres; offsets are indicated in metres.
4.	All sewer pipes are 150 mm diameter unless otherwise shown.

B) Pipe types

Asbestos cement	AC
Cast Iron cement lined	CICL
Ductile iron cement lined	DICL
Mild steel cement lined	MSCL
Polyvinyl chloride (PVC)	PVC
Polyethylene (as specified)__	PE
Reinforced concrete	RC
Vitreous clay	VC

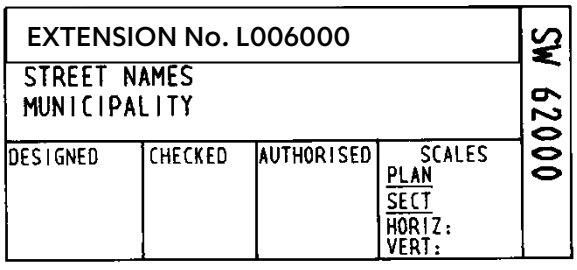
Other underground services



D)

CONSULTANT DETAILS
NAME AND ADDRESS (PH)
ACN

E)



The extension number will be provided by Barwon water. Drawing number is no longer required.

F)

ACCEPTED BY BARWON WATER
MANAGER, CUSTOMER SERVICES
No works shall commence prior to plans being accepted and signed by Barwon Water.

G) New mains

New sewer mains

SIZE	TYPE	LENGTH
150mm	PVC SN8	100m
225mm	PVC SN8	100m
300mm	VC	100m

H) Services location

Services location schedule

Street Name	Telecom	Gas	Water	Elect	Kerb
Street	1.65N	2.1N	2.7N	3.3S	4.5
Road	1.65W	2.1W	2.7W	3.3E	4.25

I) Maintenance hole information

Maintenance hole information legend

M.H. No.	Line No/Downstream Invert	Line No/Upstream Invert
N.S.L.	Line No./Upstream Invert	Line No/Upstream Invert

J) Survey marks

SURVEY MARKS AND LOCATIONS Datum AHD		LEVELS
	TBM STAR PICKET – GROVE ROAD REAR OF LOT 2	18.356
	TBM STAR PICKET – GROVE ROAD OPPOSITE LOT 4	18.356
	PSM (parish name) No 31	19.574
	PSM (parish name) No 33	19.574

K) Entry to maintenance holes

'WARNING: ENTRY INTO MAINTENANCE HOLES IS CONTROLLED BY THE *VICTORIAN OHS REGULATIONS 2007 PART 3.4-CONFINED SPACES*, *WORKSAFE COMPLIANCE CODE – CONFINED SPACES 2008 AND AS 2865-2009 CONFINED SPACES*. ANY PERSON(s) REQUIRING ACCESS TO A BARWON WATER MAINTENANCE HOLE AS PART OF THE DEVELOPMENT WORKS PROCESS MUST CONTACT THE SENIOR QUALITY AUDITOR Ph 03 5226 9204 FOR ENTRY REQUIREMENTS'.

Both water and sewer designs can be carried out on the same drawing or on separate drawings.

As previously mentioned, the accepted scales are 1:500 (preferred) or 1:1000.

Tables 9.2 and 9.3 indicates the standards for components that make up the design.

Item	Pen size	Colour
Title boundaries	0.35	Yellow
Allotment boundaries	0.25	Cyan
Existing services	0.25	Cyan
Existing water mains	0.25	Cyan
Proposed water mains	0.70	Blue
Proposed fittings	0.35	Yellow
Physical features	0.25	Cyan
Existing sewers	0.50	Blue

Table 9.2 Pen sizes and colours for line work

Text	Pen size	Colour
Street names	0.5	Blue
Existing services	0.18	Cyan
Total works table	0.35	Yellow
Notes	0.25	Cyan
Allotment/street numbers	0.25	Cyan
Drawing number	0.5	Blue
Extension number	0.5	Blue
Location description	0.35	Yellow

Table 9.3 Pen sizes and colours for text

When all drawings have been finalised and accepted, the consultant will be requested to electronically lodge (on disc or USB) the drawing for entry in Barwon Water's computer records.

9.3.1 Scales

The scales to be used are as follows:

- Plan 1:500 or 1:1000.
- The amount of detail for a given plan will determine the scale. The preferred scale where possible is 1:500.

Location plans can be produced at reduced scales and for clarity detailed connection drawings can be "Not to Scale", but are to be labelled accordingly.

Plans submitted to Barwon water are to be drawn on paper and should be A3 or A1 in size.

Barwon Water retains the original set of plans and provides the consultant with a copy. If an original set is required to be returned, an additional copy is to be submitted for approval.

Part 2: Products and materials

All materials used must be 'approved' by Barwon Water. Further information on approved products is available by contacting Barwon Water.

All materials used in Barwon Water's system must have WSAA appraisal.

Note: Not all WSAA appraised materials are approved for use in Barwon Water's system.

Part 3: Construction

12 Quality

In addition, it is recommended that clauses 2.3 and 4 of Barwon Water's *Land Development Manual* (policy document) are referred to.

13.5.3. Disused / redundant sewers

Where a sewer is no longer required, it shall be:

- Purchased by the land owner, and:
  - removed if less than 1.5 metres deep
  - grouted if equal to or greater than 1.5 metres deep.

14 Products and materials

Barwon Water's approved product list is available on its website, under the business tab, as follows

- 150/225 mm PVC sewer approved to a maximum depth of 5.0 metres.
- SewerPro permitted up to sizes DN300 mm and a maximum depth of 6.0 metres.
- Any sewer DN300 mm and above to be VC, unless equivalent approved by Barwon Water.
- Any sewer greater than 5.0 m deep to be VC, unless equivalent approved by Barwon Water.

17.2.2 Methods of deflection

Pipe curvature may only be achieved by cumulative deflection at pipe joints. Design shall specify the pipe that is proposed to be used. Manufacturer's recommended maximum joint deflection for those pipes shall be provided with the design.

17.2.4 Vertical curves

Only manufactured inspection bends are to be used for internal drop structures within manholes. The cutting of an opening on standard 90 degree bends is not acceptable.

18 Maintenance Holes (MH)

Manholes shall be precast and installed in accordance with the attached document. All manhole joints, including drops are to be sealed with FERROPRE or Barwon Water approved equivalent.

21 Fill

All excavations around a newly constructed manhole or maintenance shaft are to be backfilled with 3 % cement-stabilised sand.

22.4.4.2 Test method

All calibration certificates for all air pressure and vacuum testing equipment are to be provided by a NATA accredited organisation. Calibration certificates must be presented upon request.

All sewer mains are to be tested @ 28 kPa, and passes of 25 kPa sustained for 3 minutes.

Table MRWA

22.4.1 Does not apply.

All MS, TMS and manholes are to be tested. With any MS/TMS, after testing has been satisfactorily completed, remove the O-ring from the lid and replace lid in open position.

MH, MS and TMS test commences at 35 kPa, and passes if 28 kPa sustained for three minutes.

Table 22.6 'Minimum test times for concrete manholes' does not apply.

All test plugs and any other plug required to isolate a Barwon Water sewer main is to be inflatable type or any other type approved by Barwon Water. Any test plug is to be tommed and also secured at the surface. For further details on this requirement and for a copy of Barwon Water's procedure for installation of plugs, please contact Development Services.

22.6 Deflection (ovality) testing of flexible sewers

Ovality testing is required on ALL mains regardless of pipe material.

22.7 CCTV inspection

Closed circuit colour TV inspections are generally not required but may be required by Barwon Water in special circumstances.

All bored sections of sewer mains are to be CCTV inspected as per requirements outlined in the Land Development Manual.

24 Connection to existing sewers

The Contractor shall not commence work that involves connection into live sewerage lines or maintenance holes unless authorised by Barwon Water's Senior Quality Auditor.

When any works are to be carried out on existing sewerage work, the Contractor shall ensure that no person enters the works in an excavation, maintenance hole or the like where live sewerage is flowing or sewerage gases are likely to be present without approval of the Senior Quality Auditor.

The Project Manager shall give Barwon Water three days notice before commencing work on existing sewerage works.

26 Work as constructed details

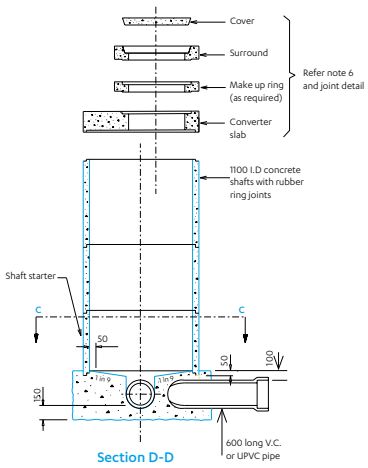
Refer to the survey manual located on Barwon Water's website under the business -> land development tab.

All as constructed records must be provided to Barwon Water within 10 working days of the completion of the works.

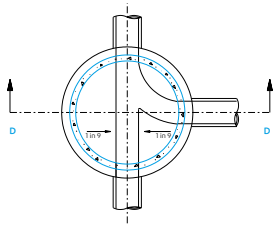
Part 4: Standard drawings

Drawing number	Title/ Comments	
70083A	Maintenance hole chamber detail	Single gascheck manhole only applicable
70095	House connection branch details	Type Spec. A, MS, TMS, applicable
70096	House connection branch details	Type A & B
70097	House connection branch details	Type C & OB
70116	House connection branch details	Deep HC Details – Type B & Spec. TM

Standard maintenance hole

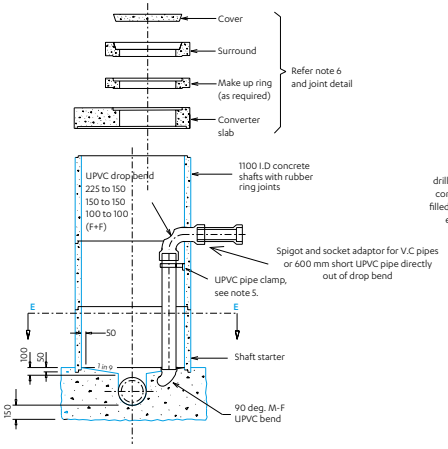


Section D-D



Section C-C

Maintenance hole with single drop



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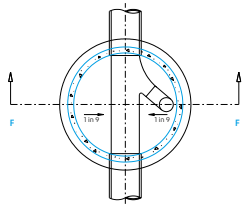
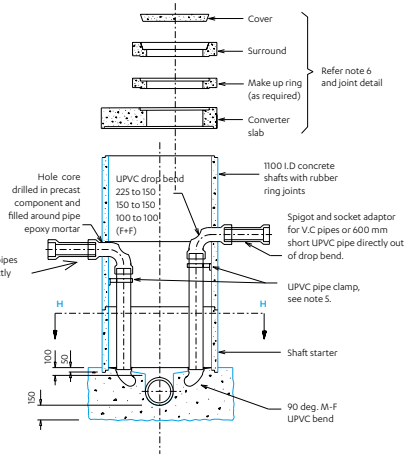
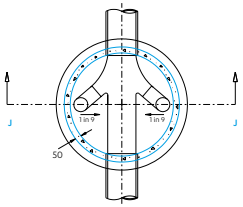


Section E-E

Maintenance hole with two drop

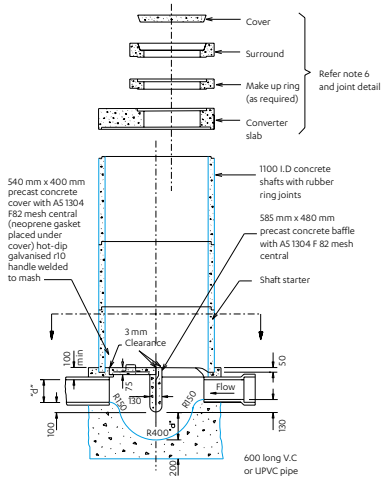


Section J-J

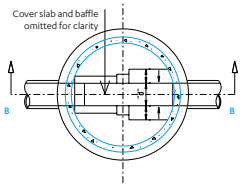


Section H-H

Gas check maintenance hole

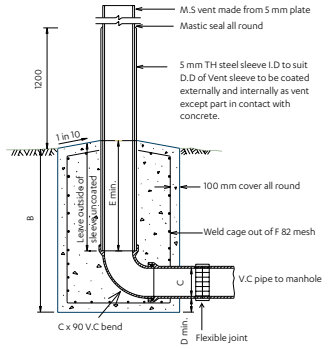


Section B-B

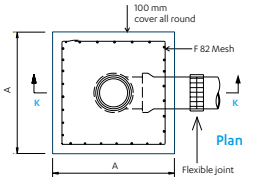


Section A-A

Vent detail

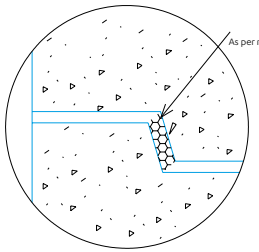


Section K-K

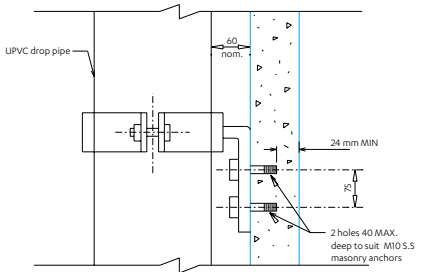


Notes

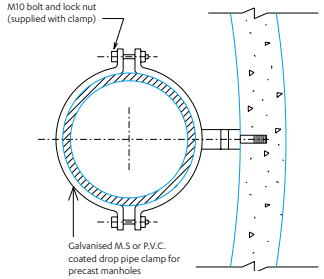
1. All concrete to be class 25 to A.S. 3600 Standard
2. Maintenance hole to be centrally placed around intersection point of wastewater centrelines unless otherwise specified.
3. UPVC pipes to be S.E.H, in accordance with A.S. 1260 UPVC pipes for wastewater applications.
4. Joints in vertical UPVC drop pipes to be pushed fit. (No solvent or rubber rings to be used)
5. UPVC drop pipe clamps shall be provided at each UPVC socket at a maximum spacing of 1 metre. No clamps are required for UPVC pipe drops less than 1 metre between invert levels. (Refer to detail)
6. **a)** Covers and surround type shall be in accordance with long sections or as directed by (Barwon Water). Generally Heavy Gatic type kerb and covers shall be provided in roadways and driveways - Gatic type "D" covers elsewhere.
   b) Maintenance hole within road reserves/ footpaths shall be constructed with at least two make up rings to facilitate future raising or lowering.
   c) i. Inspection chamber covers are to be graded to suit natural surface or footpath/road levels as directed by (Barwon Water).
   ii. To achieve the desired slope surround is to be seated on appropriately shaped epoxy to the satisfaction of (Barwon Water)
7. Unless otherwise directed by Barwon Water, covers shall be located directly above the downstream pipes.
8. In lieu of 100 to 100 UPVC drop bend, 100 UPVC 88 deg. Bend with capped rear access bend, may be used.
9. Inspection chamber drops for wastewater mains of 300 mm and above will be detailed separately.
10. Where future extensions from inspection chambers are designated on the drawings, appropriate channel(s) and capped pipes(s) will be provided as directed by Barwon Water.
11. All dimensions in millimeters
12. See installation guide for precast concrete maintenance hole.
13. Squat top can only be used in maintenance holes, less than 1.5 m deep
14. Taper top only to be used as directed by Barwon Water.
15. Maintenance holes to be tested as per Barwon Water developer works process.



Joint detail (not to scale)
(Converter slab to make ring to surround)



Detail drop pipe clamp (not to scale)



Standard drawing

		Dimensions in millimetres								
	Vent height	6000			9000			12000		
	Vent diameter	150	225	300	150	225	300	150	225	300
Symbols as shown	A	1000	1000	1300	1100	1100	1300	1200	1200	1300
	B	1000	1000	1300	1250	1250	1300	1750	1750	1750
	C (dia)	150	225	300	150	225	300	150	225	300
	D min.	150	150	150	150	150	150	150	150	150
	E min.	400	450	450	600	620	620	800	800	820

Note: Vents to be coated internally with an epoxy coal tar enamel and painted externally with zinc rich primer and two coats of an approved finishing paint.

References			
Drawing	Title	Drawing	Title

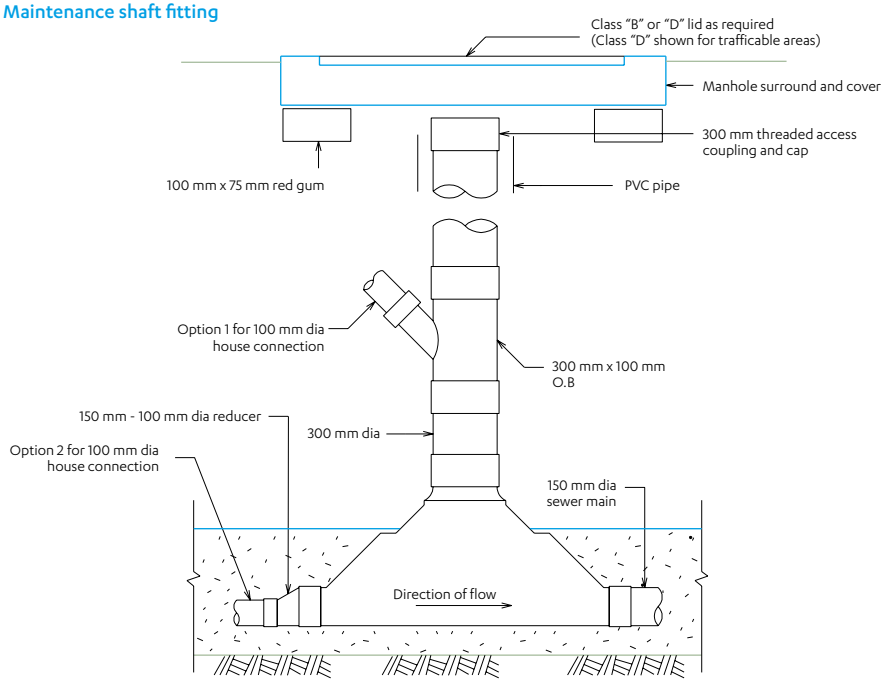
No.	Date	Amendment description	Revised by	Approved

Maintenance hole chamber and vent details for waste water reticulation mains					
PDMS No.:	Designed:	Drawn: 05/10/04 B. Macauley	Checked:	**Scales:** Plan Section Horizontal Vertical Scale for A1 Sheet	70083 - A
Contract/ Quotation No:	Drawing discipline: MW sheet no. 1 of 1	Senior Engineer:	Manager:		

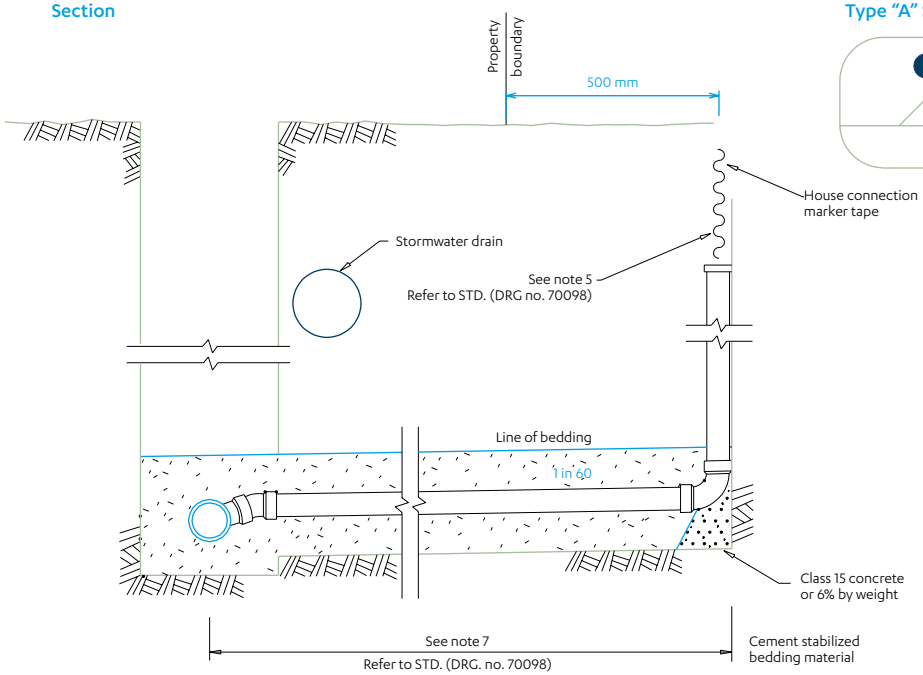
Barwon Water

GSDM_10496

Maintenance shaft fitting



Section



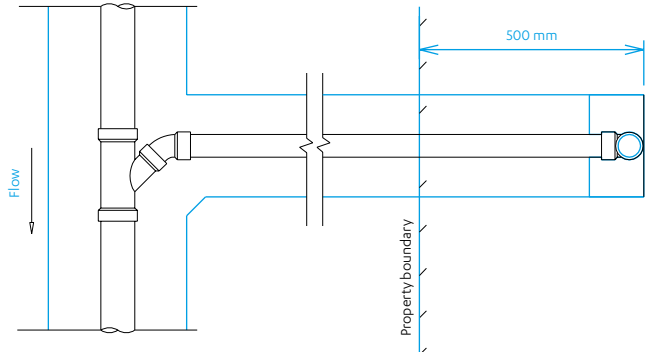
Type "A" Special

Plan
Special type "A"

Required materials: O.B., 45˚ bend M and F,
90˚ bend F and F 2 cap, access coupling, pipe.

To avoid stormwater drains (refer note 7)
where jump up is required

Refer to STD. (DRG. no. 70098)
B.R.MGR



Symbols legend

Sewer

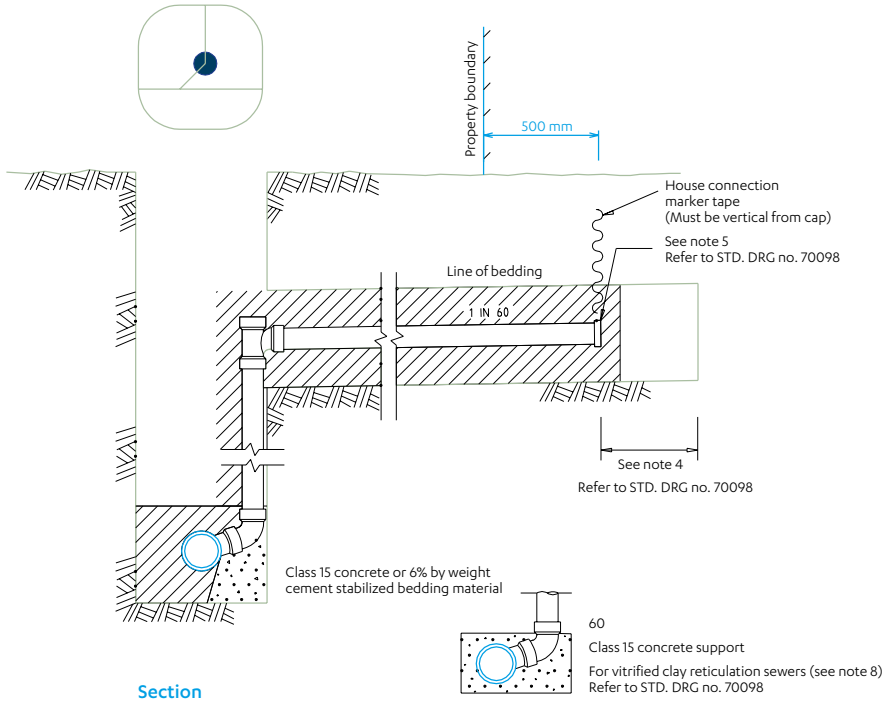
- Type "A" jump up
- Type "B" jump up
- Type "C" slide line
- Oblique junction
- Type "A" special
- Type "TM" special
- Type "B" special

Note: All items are to be covered by a sewer easement in favour of Barwon Water.
Refer to standard drawing no. 70098 for general notes. Revision B

SMS and TMS details and SP 'A' house connection branch details			
Drawn:	Checked:	Scales N.T.S	70095
Dept Mgr	General Mgr		

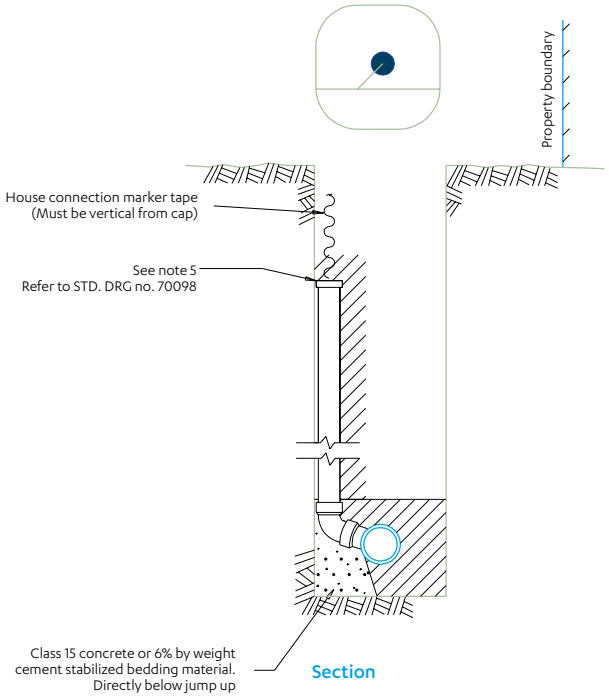
Barwon Water

Type "A" jump up



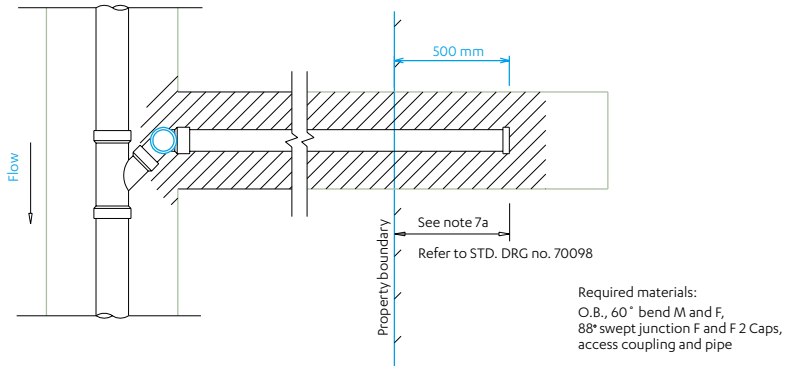
Section

Type "B" jump up



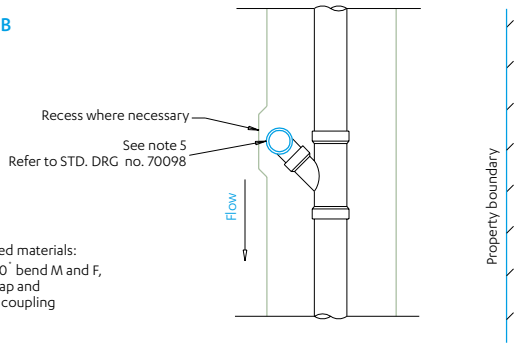
Section

Plan type A



Required materials:
O.B., 60˚ bend M and F,
88˚ swept junction F and F 2 Caps,
access coupling and pipe

Plan type B



Required materials:
O.B., 60˚ bend M and F,
pipe, cap and
access coupling

Symbols legend

Sewer

- Type "A" jump up
- Type "B" jump up
- Type "C" slide line
- Oblique junction
- Type "A" special
- Type "TM" special
- Type "B" special

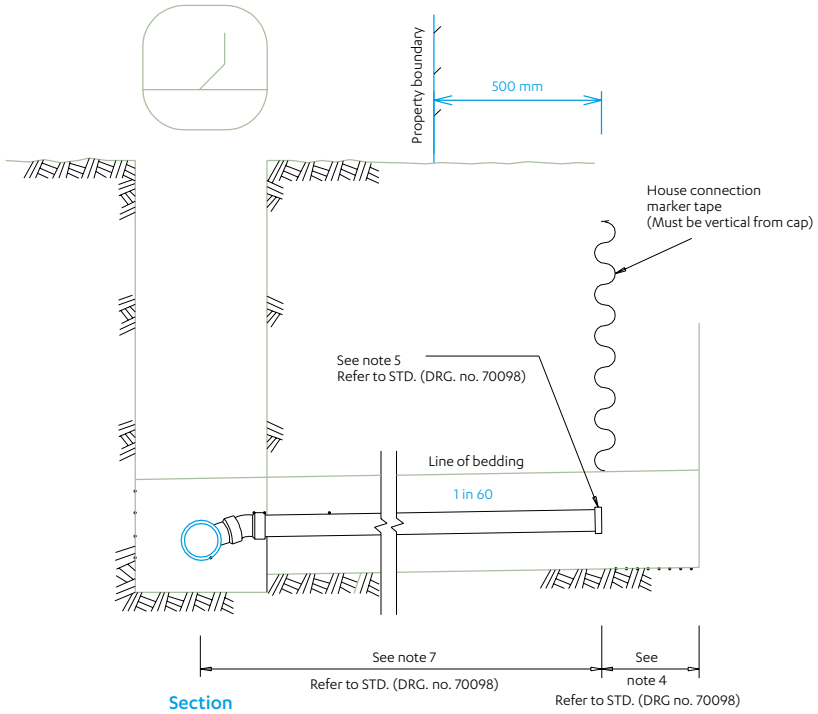
Refer to standard drawing no. 70098 for general notes. Revision B

House connection branch details			
Drawn:	Checked:	Scales N.T.S	70096
Dept Mgr	General Mgr		

Barwon Water

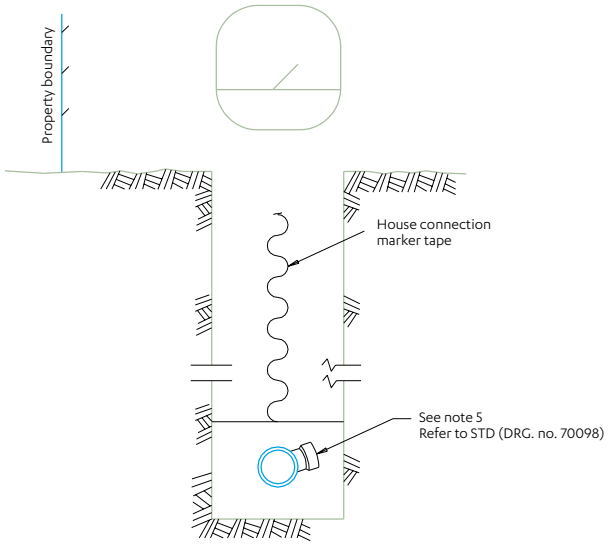
GSDM_10496

Type “C” slide line



Section

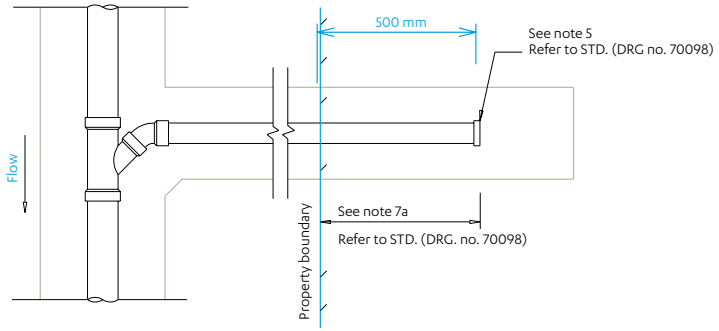
Type “OB” oblique junction



Section

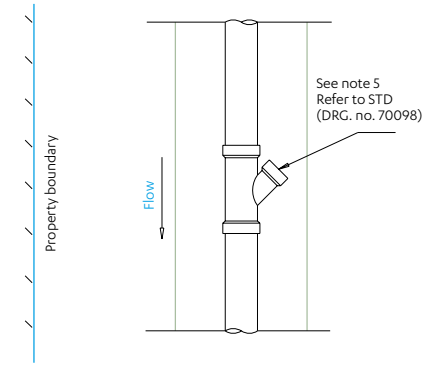
Plan
type C

Required materials:
O.B., 45˚ M and F bend, pipe, access coupling and pipe



Plan
oblique junction

Required materials:
O.B. and cap



Symbols legend

Sewer

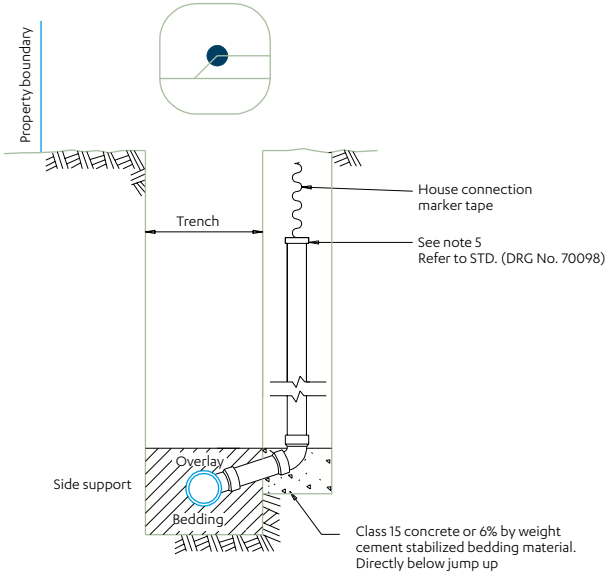
- Type “A” jump up
- Type “B” jump up
- Type “C” slide line
- Type “OB” oblique junction
- Type “A” special
- Type “TM” special
- Type “B” special

Refer to standard drawing no. 70098 for general notes Revision B

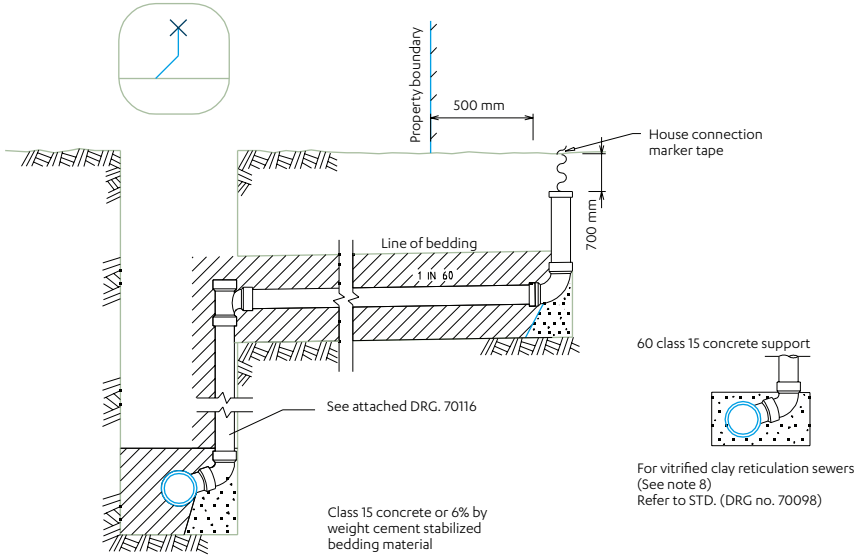
House connection branch details			
Drawn:	Checked:	Scales N.T.S	70097
Dept Mgr	General Mgr		

Barwon Water

Type “B” special



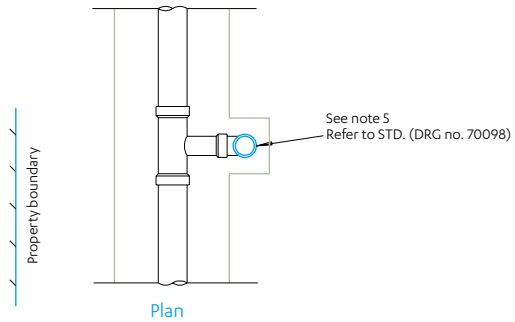
Type “TM” special



Section

Special B

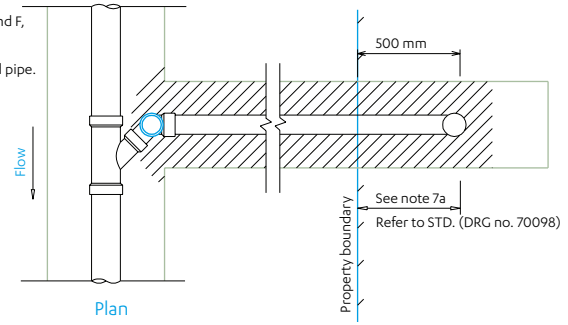
Required materials:
O.B., 60˚ bend M and F,
pipe, cap and access coupling



Plan

Type “TM” special

Required materials:
O.B., 60˚ bend M and F,
88˚ swept junction
F and F 2 caps,
access coupling and pipe.



Plan

Symbols legend

Sewer

- Type “A” jump up
- Type “B” jump up
- Type “C” slide line
- Oblique junction
- Type “A” special
- Type “TM” special
- Type “B” special

Note: Any house connection branches below 3 m to be constructed as shown
Refer to standard drawing no. 70098 for general notes. Revision B

Deep house connection detail			
Drawn:	Checked:	Scales N.T.S	70116
Dept Mgr	General Mgr		

Barwon Water

GSDM_10496