

Miriam Vale Shire Council

Water Supply Standards

This document sets out the requirements for the design and construction of water supply systems for acceptance by Miriam Vale Shire Council as donated assets.

The Water Supply Code of Australia (WSCOA) is not reproduced in this document. The document can be obtained from the following organisations:

Water Services Association of Australia	Standards Australia
469 Latrobe Street	1 The Crescent
Melbourne Victoria 3000	Homebush NSW 2140

Miriam Vale Shire Councils water supply requirements are those contained in the *Water Supply Code of Australia – WSA 03-2002 Version 2.3*, published by the Water Services Association of Australia with the additions and amendments set out in this document. Part and Section references are those given in the WSCOA. Where no reference is made to a Section in the WSCOA, the Section applies in full without amendment.

If conflict is considered to exist between the WSCOA and an amendment the matter shall be referred to Council for resolution.

The water supply requirements are applicable to the majority of situations. However, variations may be necessary to meet special circumstances or to overcome other problems not addressed in the requirements. Whenever the proposed design varies in anyway from the requirements the proposed variation shall be authorised by Miriam Vale Shire Council.

PART 0: GLOSSARY OF TERMS, ABBREVIATIONS AND REFERENCES

The following definitions from the WSCOA are reproduced below for the assistance of readers of this document.

Water Agency	Miriam Vale Shire Council
Concept Plan	A package of information provided to the Designer by the Water Agency to enable appropriate planning and design of major water supply system components to be performed.
Constructor	An individual, corporation or legal entity including any contractors and sub-contractors that is accountable at law for delivery of Works under a specific contract or development agreement.
Developer	A person, organisation, local government authority or government authority (other than the Water Agency) responsible for provision of a water supply scheme or water reticulation scheme.
Designer	Person(s) or firm responsible for a design output. Such person or firm may be accountable to a Project Manager or other person having responsibility under a contract or otherwise.
Works	All those Works being water mains, valves, hydrants and accessories and shall include valve chambers and storage facilities as shown on the Design Drawings and include any part of the Works.

PART 1: PLANNING AND DESIGN

1.4 Design Output

Any variations to the Water Supply Standards, and the reasons for the variation, shall be highlighted in a boxed note on the design drawings.

1.5.2 Design Responsibilities – Water Agency

Unless otherwise agreed, the Water Agency will provide a concept plan nominating the size and location of reticulation mains and pressure control valves, etc. The Water Agency will ensure that the trunk mains are capable of supplying the minimum standards of flow and pressure stipulated in the Water Supply and Sewerage Guidelines, DNR, Dec 2005. MVSC may make available a WaterCad model of the Agnes Water/1770 reticulation system.

1.5.3 The Designer

The design of the works shall be carried out under the direction of and certified by a Registered Professional Engineer of Qld. (RPEQ).

The Designer shall obtain the written approval from Council for any variations to the requirements of latest edition of WSA 03-2002 Water Code as amended by this Supplementary Manual prior to the submission of the final design.

2.1.2 Providing a New Water Supply

Rainwater storage tanks must be provided for all buildings in accordance with Appendix I. The minimum capacity to be provided is listed in the following table:-

Class of Building	Example of Building	Minimum Rain Water Storage Requirement	
		Single Storey	Multiple Storey
1a	Single detached house	22,000 litres	22,000 litres
1b,2,3,5,6,7,8,9	All other habitable buildings	The greater of 22,000 litres or 73.3 X Roof Area in square metres	

Where a development is proposed in a Defined Water Supply Area and it does not fit in with the Water Agency's sequencing policy for provision of water services, the proponent must provide a water supply strategy that can supply 250l/ep/d, based on full occupancy throughout the year, and with a failure rate not exceeding 2%.

Fire fighting requirements listed in Section 3.2.4 need to be provided.

For all commercial developments, the water quality needs to comply with the Australian Drinking Water Guidelines 2004.

2.2.1 Demands

The reticulation system shall be designed to handle a flow rate of 450 l/ep/d. The ep density is to be based upon the design populations for particular developments listed in the Infrastructure Charges.

Fire Fighting requirements shall be provided in accordance with Section 3.2.4

2.2.3 Peak Demands

Peak demand factors are based on the DNR Water Supply Guidelines, October 1989. The following factors are to be used in modeling water supply demands:-

Mean Day Maximum Month/Average Day =1.5

Maximum Day/Mean Day Maximum Month=1.5

Maximum Hour = 2 X Average Hour Demand for Maximum Day

2.3 System Configuration

Supply mains of DN250 and larger shall be classed a trunk mains. No service connections shall be permitted on trunk mains.

2.4.3 Operating Pressures – Amend Table 2.2

The minimum and maximum mains pressure for residential zones shall be 250kPa and 800kPa respectively. The minimum and maximum mains pressure for industrial/commercial properties shall be 300kPa and 800kPa respectively.

2.4.3.2 Maximum allowable service pressures

The maximum allowable SP is 380kPa. The SP for consumers is measured at the water meter.

2.4.3.3 Minimum allowable service pressure

The minimum allowable SP is 250kPa for residential zones and industrial/commercial properties.

2.6 Pumping Stations

The conditions under which in-line boosters may be acceptable are:

In-line booster pumping stations, without associated high-level storage, may be used in situations where all of the following conditions apply:

- (i) It is impractical to build storage;
- (ii) Duty Standby is provided
- (iii) Each property connection must have a minimum static pressure of 50kPa when the pump is offline; and
- (iv) The pump motor is to be variable speed.

3.2.1 Sizing of Mains – General

The Water Agency standard reticulation main sizes are DN 100, 150, 200, 250 and 300.

3.2.2 Minimum Pipe Sizes

DN 63 PE shall be used in cul-de-sacs, subject to a maximum length of main of 40 m and not more than 8 water service connections.

3.2.4 Fire Flows

Fire fighting requirements shall be provided in accordance with Water Supply and Sewerage Guidelines, DNR, Dec 2005, namely 15 l/s for 2 hours for residential areas and 30 l/s for 4 hours for commercial areas. These flows are to be superimposed upon 2/3 maximum hour demands for populations less than 2,000 ep, and maximum hour demands for populations greater than 3,000 ep.

3.2.5.3 Hydraulic Roughness Values

The hydraulic analysis of the system shall utilise Hazen-Williams C roughness values of 150.

3.5.3 Table 3.2. Fatigue De-Rating

For pumped mains, assume a minimum 6 cycles/day unless hydraulic modeling indicates otherwise, ie for boosted systems

3.7.2 Minimum pressure class

The minimum pressure class for water supply pipes and fittings shall be Class 12. PVC pipe shall be Series 2 Class 12 (AS/NZS 1477) minimum.

4 Hydraulic Design

Existing and proposed water supply systems upstream or downstream of the area under design shall be included in the hydraulic analyses. Design shall ensure that Standards of Service are maintained in existing or proposed water supply systems.

4.1.1 Design Tolerances

Horizontal alignment shall be referenced to the Australian Map Grid coordinate system GDA 94.

4.3 Location of Water Mains

Water mains shall be located in accordance with Public Utilities in Subdivisions, Typical Service Conduit Sections, IMEAQ Standard Drawing R-0101.

Pipe fittings shall not be positioned under kerb and channel.

4.3.3 Water Mains in Easements

Easements are required where the main is not located in a dedicated road reserve.

The easement width shall be 3m for reticulation mains and 5m for trunk mains. The Developer shall arrange for the provision of easements.

Water mains shall not be located in an easement to reduce capital costs where a suitable route in a road reserve is available.

4.3.6 Contaminated Sites

Applicant shall be referred to the appropriate State Government Agency during the IDAS approval process.

4.3.9 Railway Reserves

Where a water main crosses a Railway Reserve a deed of Agreement is required between the Railway Authority and the Water Agency.

4.3.11 Overhead power lines and transmission towers

Where the distance from a metal water mains to a power line or transmission tower is within the distances stated in this clause, a report detailing the procedures to be adopted for the construction and maintenance of the main shall be provided by a Registered Professional Engineer.

4.3.12 Tracer Wire and Marker Tape

Tracer wire of 2mm 316 stainless Steel cable, 7/19 construction shall be installed immediately above the marker tape on all water mains.

4.7 Connection of New Mains to Existing Mains

Connections shall comply with:

All works on the existing reticulation system shall be considered as "live works" and will be constructed by the Water Agency at the Contractor's cost. These works shall be clearly delineated on the Design Drawings and shown in sufficient detail such that the works can be readily constructed

The connection point to the existing system shall be located to minimise disruption of supply to customers and be subject to Council approval.

Acceptable connection arrangements

(a) Extension from the end of an existing main.

A socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall commence from the valve.

(b) Side branch from an existing main.

A flange branch with a socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall commence at the valve. If it is not possible to locate the valve adjacent to the existing main, the Contractors works shall commence with a gate valve at least 5 m from the existing main. If the proposed main crosses a roadway adjacent to the connection point, the full length of main at the road crossing shall be included in the "live" works.

(c) New main between existing mains.

A flange branch with a socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall construct from this valve to no closer than 5 m from the other main. The Water Agency shall complete any outstanding connections to the existing system after acceptance of the Contractors works.

4.8 Termination Points

Where a future main is planned to extend the system beyond the development currently being serviced the water main shall finish with a valve. A legal right of way (easement or reserve) shall be provided 3 m wide through the adjoining allotment(s) to permit its future extension. The right of way shall be vested in Council.

4.8.3 Temporary ends of water mains

A temporary dead-end termination point shall comprise a length of pipe extending from a scour fitting. When the main is to be extended, the dead end shall be removed, a valve fitted and the mains laid. If the extension is likely to occur shortly after construction of the main, a valve rather than a dead-end shall be installed.

4.9.1 Sizing of Property Services

Standard sizes for water services are DN 20 and DN 25.

Single residential lots shall have a DN 20 property service unless a DN 25 service has been requested by the property owner and agreed to by the Water Agency.

Property services laid across a road shall be one size larger than the individual property connection. The mains tapping fittings and the meters are common for DN 20 and DN 25 services.

If the long-term static head of the property service is less than 350 kPa (35m) or if private booster is required, the minimum size of property service shall be DN 32.

All the sizes stated above relate to copper services. Polyethylene water services shall be one nominal DN size larger than that of a copper service.

4.9.2 Location of Property Services

Where practicable, property service connection points shall be located 500 mm from the RP side boundary on the opposite side of the lot to the electrical service pillar-box. If, as may occur at corner properties, electrical pillar-boxes are located on both side boundaries, the property service connection shall be placed at the RP boundary truncation point.

Services shall be located at least 0.5 m from electrical light poles and clear of existing or future driveways

Property services laid along a footpath shall be located on a 1.2 m alignment from the RP boundary. DN 100 and 150 services shall terminate in the footway approximately 250 mm from the property boundary.

4.9.3 Multiple Property Services

Multiple Property Services shall comply with:

Multiple services will only be permitted for single residential lots where the services are laid across the road carriageway and shall be limited to serving 2 lots.

Multiple services shall be laid in copper.

4.9.4 Property Service Conduits

Water services up to DN32 which are located under existing or future roadways, concrete or paved driveways, footpaths, bikeways or other hardstand areas, shall be

installed in a solvent welded DN 50 Class 12 PVC conduit. The conduit shall have a maximum length of 25 m and extend 150 mm beyond the back of the kerb or concrete/paved area. Conduits shall not be installed in the same trench as electrical cables.

Brass or Stainless Steel markers indicating the service location shall be placed on the kerb or concrete/paving edge.

4.9.5 Tracer Wire and Marker Tape

PE water services shall have a 2mm 316 stainless steel 7/19 construction cable plus marker tape placed 150mm above the pipe embedment. Where the PE service is placed inside a conduit the marking tape and tracer wire shall be placed 150mm above the conduit

4.9.6 Water Services DN100 and Greater

Water services \geq DN 100 shall be specified in DICL in accordance with the requirements for comparable sized DICL water mains. Vertical bends shall have flanged connections. SCL pipework is acceptable where space constraints prevent the use of DICL. PVC shall not be specified for water services.

4.9.7 Services to Community Title Schemes

Community title schemes shall be provided with a single service to the property boundary. Responsibility for water supply charges rests with the Body Corporate.

4.10.5 Underground Obstructions & Services

The location of all existing services shall be confirmed with the appropriate Authority prior to the commencement of any excavation work.

Council takes no responsibility for the accuracy of any as constructed information.

4.10.5.2 Clearance Requirements

Water mains shall be located with sufficient clearance to structures to allow for maintenance and operation activities and provide protection against damage from pipeline bursts.

4.10.7 Deviation of Mains Around Structures

The angle and type of all bends shall be shown on the Design Drawings

5.5.1 Geotechnical Considerations

Where difficult ground conditions are anticipated a geotechnical and construction method report shall be submitted with the design.

5.6 Pipe materials

For approved pipe materials refer to Appendix A.

Where a proposed road crosses an existing AC main, the main shall be replaced with an approved material.

5.9.1 Pipe Anchorage

All DN100 and larger valves and tapers, including flanged items shall be secured with anchor blocks

5.9.2 Thrust blocks

Thrust blocks shall be sized for a design pressure of 1200 kPa (120 m).

5.9.4 Restrained elastomeric joint seals

Where space available for thrust blocks is limited, a commercial restrained joint system may be used subject to Water Agency approval.

6.1.2 Valves – Siting Principles

Valves, hydrants and scours shall not be installed in trafficable roadways where an alternative location is available.

6.2 Stop Valves

Valves shall be *anticlockwise* closing. Resilient seat valves shall be used. Valve covers shall be in accordance with WAT-1304, Type H1.

6.2.3 Stop valves for reticulation mains

Stop valves for reticulation mains shall be provided in accordance with Table 6.1 or as directed by the Water Agency.

6.4.2 Air Valves Type

Air valves shall be of Vent-o-Mat type valve or other approved equivalent.

6.7 Swabbing points

Swabbing points are not required.

6.8 Hydrants

Hydrants shall not be installed on constant flow reticulation systems.

Hydrants shall be DN80 spring hydrants with the standard claw type head.

Hydrant boxes shall be painted safety yellow with glass beads embedded in the paint.

Hydrants shall be located in line with side boundaries of a lot and not more than 80 metres apart. A hydrant shall be located within 10 metres of an intersection.

Where the end of the water line is permanent, a duck foot bend hydrant shall be used. Hydrant covers shall be in accordance with WAT-1306, Type H2.

6.8.3 Hydrant types

All hydrants shall be of the spring type with standard claw type head.

6.8.6 Hydrant sizes

Hydrants shall have DN 80 flanges.

6.8.7 Hydrant Spacing –

The spacing of hydrants on water mains in urban areas shall comply with the following requirements:

- within 40 m of property boundaries and within 90 m of the furthest point of the building envelope measured around the perimeter of the building envelope, except that in residential in-fill areas only the 90 m requirement applies,
- at a maximum interval of 80 m,
- as directed by the Water Agency

7.2 Design Drawings - General

Design Drawings shall comply with Miriam Vale Shire Council Planning Scheme Policy No. 1 - Appendix B.

7.3 As Constructed – General

As Constructed drawings shall comply with Section 8.4 of the Miriam Vale Shire Council Planning Scheme Policy No. 1.

PART 2: PRODUCTS AND MATERIALS

8 Products and Materials Overview

As this area is reasonably remote, the types of materials utilised in water supply systems shall be limited such that the availability of spares is maximised and the inventory of spares carried by repair crews and Council stores is minimised.

Pipeline Materials

Below DN100 water mains shall be constructed in:

- a. DN 63 PE (AS/NZS 4130) PN12, blue lined.

Between DN100 and DN250 (inclusive) water mains shall be constructed in:

- b. uPVC AS/NZS 1477, Series 2 PN12 rubber ring joint;
- c. PVC-M AS/NZS 4765, Series 2 PN 12 rubber ring joint;
- d. OPVC AS/NZS 4441, Series 2 PN Class 12 rubber ring joint;
- e. DICL AS/NZS 2280, PN35 rubber ring joint, polyethylene wrapped AS 3680.

DN300 and over water mains shall be constructed in:

- f. DICL AS/NZS 2280, K9, rubber ring joint, polyethylene wrapped AS 3680;

Ductile Iron (Pipes)

DI pipe shall not be used in ground below RL 5.0 unless soil testing indicates that actual or potential acid sulphate soil conditions are not present.

Gibault Joints

Gibault joints shall be long barrel type with stainless steel (Grade 316) fasteners. Gibault joints used below RL5.0 or in the presence of actual or potential acid sulphate soils shall be protected by application of petrolatum mastic and tape wrap.

Stabilised Sand

Stabilised sand shall contain a minimum of 4% cement by weight.

Embedment Material

Where pipes are installed below RL 5.0 or are likely to be in contact with actual or potential acid sulphate soils, pipes shall be bedded using a limestone crusher dust material complying with the WSCOA grading requirements.

8.7 Additional Product and Material Information

Valves

Valves shall be PN 16 or better with spigot or socket joints and shall be anti-clockwise closing. Valves shall be fully coated internally and externally with thermo-bonded polymeric coatings in accordance with AS4158 (rilsan nylon 11 or similar approved coating).

Valves shall be fitted with fully encapsulated rubber sealing wedges and o-ring seals, complying with AS 2638.2 - 2002. Stainless steel (316 grade) fasteners shall be used.

Hydrants

Hydrant tees shall have socket joints. Hydrants shall be DN80 spring hydrants coated internally and externally with thermo-bonded polymeric coatings in accordance with AS4158 (rilan nylon 11 or similar approved coating).

All hydrants shall suit a DN100 tee or riser. Valve and hydrant boxes shall be in accordance with WAT-1304 to WAT-1306. All hydrants shall be supplied with coated metal caps.

Fittings

Socketed fittings shall be the elongated (extended barrel) type i.e. griptite/nortite or equivalent, suitable for PVC applications.

Gibault joints shall be the elongated (extended barrel) type.

All nuts, bolts and washers shall be Grade 316 Stainless Steel installed with nickel anti-seize grease or equivalent applied to the threads prior to assembly.

All fittings shall be fusion bonded polyethylene (FBE) coated ductile iron, complying with AS/NZS 2280 (2004) and AS/NZS 2518.

10.2 Personnel Qualifications

The Plumbing and Drainage Regulation 2003 requires that the work be carried out and supervised by a licensed plumber.

During any construction activity at least one person on site must have completed a pipe laying training course appropriate to the type of pipeline under construction and have documentary evidence of current accreditation for the type of pipe being installed.

The pipe laying training courses appropriate for various pipelines are:

Pipeline	Course	Training contact
DICL	Century Plus	Tyco Water – Training Co-coordinator Ph: (03) 9217 3154
PVC	Flexitec PVC Pipe Installation	Partec Mt Gravat TAFE Ph: (07) 3849 7878
PE	Welding of PE – Electro-fusion	Partec Mt Gravat TAFE Ph: (07) 3849 7878

12 Products and Materials

All pipe materials and fittings to be used in the water reticulation network shall be authorised by the Water Agency. A list of the authorised items is included in Appendix A.

Where products are required, but not included in the Authorised product list, they shall be referred to the Water Agency for appraisal.

Pressure Pipes and Fittings

Installation of pipes and fittings shall comply with the following:

PVC Pipe

PVC shall be laid in accordance with the requirements for laying PVC.
PVC pipes shall not be cut within 1.5m of the socket and in general the minimum length of PVC pipe shall be 1.5m.

(This requirement relates to the potential for longitudinal splits to occur down the main particularly if a hole is drilled in a short length of pipe. In addition short lengths of pipe have the potential to compound joint rotation increasing the possibility of spigot and socket disengagement.)

Ductile iron or cast iron spigots shall not be joined to PVC sockets.

Stainless steel repair clamps shall not be used on oPVC pipes

FBE Coated Flanges

FBE coated flanges shall be joined by Grade 316 stainless steel bolts, nuts and washers. In this configuration, flanges do not need to have a corrosion protection wrapping.

Restrained Joint Rubber Sealing Rings

Where restrained joints are used on DICL mains, the joint shall be installed in accordance with manufacturers written instructions.

The joint shall be tested by inserting a feeler gauge to ensure that the rubber ring is installed with the correct depth.

Where restrained joint DICL mains are used, a pink marking strip shall be placed over the top of the embedment material directly over the pipe to alert maintenance crews of the restrained joints.

Steel pipes and Fittings

Flanged Joints

All flanged connections shall be tightened evenly and alternatively across the flange until a torque of 60 Nm for M 16 and 140 Nm for M 20 bolts is achieved. Hot-dip galvanised bolts, nuts and washers shall be used for flanged fittings within concrete valve chambers or above ground locations.

Polyethylene Pipes and Fittings

Only DR brass male threads shall be screwed directly into pre-tapped connectors or tapping bands. Male thread polyethylene connection fittings shall not be used in such connections. *(Ground movement can cause the PVC fittings to shear at the thread interface.)*

Metallic male threads shall not be screwed into unrestrained plastic female threads. *(Excessive tightening can cause the plastic socket to split, or over time, the joint can leak due to plastic creep.)*

Field butt welding of PE pipe shall be carried out by a suitably qualified welder.

The minimum allowable bend radius for PE pipe is 25 x Pipe OD.

PE pipe has a high coefficient of expansion (0.18mm/m/oC) and must be installed in the trench such that no thermal induced stresses develop on the pipe or fittings.

The backfilling of side support and overlay zones shall not be placed when the ambient temperature adjacent to the pipe falls outside the range 12-27°C. The pipe shall be snaked horizontally in the trench to allow for thermal movement.

PART 3: CONSTRUCTION

13.2 Limits of Excavation

Where excavation exceeds the required depth by more than 200mm, the excavated material shall be replaced with stabilised sand to the required level.

15.2.1 & 15.2.3 Bending of PVC Pipe

Bending of PVC pipe is not permitted.

15.6 Property Services and Water Meters

Water service lines shall be installed to each property boundary in accordance with the following table:

<u>Land Use</u>	<u>Water Service By</u>
Residential, Rural Residential, and the constant flow scheme	Constructor
Non-Residential Water Service Areas such as Industrial and Commercial	Council

Council will install the meters at a later date.

Tapping Bands

Tapping bands shall be 40mm nominal bore outlet and shall serve no more than two properties via branching of the service pipe.

The tapping band shall be installed with the outlet vertical and located within 0.5m of adjoining property side boundaries.

In constant flow developments, a tapping band may be substituted for an air valve.

Pipe

Service pipes shall be installed perpendicular to the front property boundary and extend 300mm into each property, at 0.5m offset. At the termination of the service pipe, the pipe shall be 450mm deep and completely backfilled with bedding material to natural surface level.

15.10.2 Marker Tape and Tracer Wire

Marking tape and tracer wire shall be laid above buried non-metallic pipes along the top of the embedment zone or at 1 m below the surface; whichever is the higher.

15.11.3 Distance Between Fittings

Sockets of adjacent fittings shall be separated by a straight length of pipe of minimum length of

500 mm.

16.2 Embedment Material

Embedment material for water mains and water services shall be 5 to 7 mm single sized aggregate. This is considered to be self compacting.

16.3.1 Compaction of Embedment – Methods

Flooding compaction is not permitted.

16.3.2 Compactions Trials

The pre-qualification of embedment compaction method shall not be used as an alternative to compaction testing.

17.1.2 Trench Filling-Material Requirements

Trench filling material shall consist of the best material from the trench excavation, free from organic matter, with particle size not exceeding 75mm and can achieve the required compaction.

A layer of geo-fabric is to be placed between the embedment material and backfill material.

For trenches in the roadways and footpaths, fill material shall be in accordance with the requirements of the road owner.

18 Swabbing

Swabbing is not required.

19.3.4 Trench Fill Compaction Testing

The Contractor shall be responsible for all compaction testing and shall arrange for the testing to be carried out by a NATA certified Test Laboratory.

Prior to commencing work the Contractor shall prepare a testing plan showing the number of tests and depths in each zone where tests are to be carried out.

The Laboratory shall randomly select test locations in each zone. The Water Agency may direct the Laboratory to undertake additional tests in any zone. The test locations shall be uniformly distributed over the works.

Test Frequency

Testing shall not be clustered within a zone or at boundaries of a zone.

In deep trenches where more than 1 layer is to be tested, the test locations shall, where practicable, be staggered from those layers above or below by at least 5 m for water mains and 2 m for water services.

Compaction Certificates

Prior to the issue of the Certificate of Practical Completion, the Contractor shall submit the individual compaction test records and a Certificate of Compliance from the NATA Test Laboratory confirming that the tests have been completed in accordance with the testing plan and that the specified compaction has been achieved.

Non-Compliance of Compaction testing

If the compaction tests fail, the Contractor shall remove and re-compact the fill from all areas that fail the test. The compaction tests shall be repeated at the Contractors' cost until satisfactory compaction levels are achieved.

19.4.1 Pressure Testing – General

Testing shall include water services and stop cocks.

19.4.2 System Test Pressure

The test pressure shall be 1200 kPa applied as close as practicable to the lowest point of the main.

19.4.3 Maximum allowable loss

No water loss is permitted over a 15 minute period at the test pressure.

19.4.4 Pressure Test Procedure

All Pressure Testing in accordance with AS 2566.2

19.5 Bacteriological Test

Council shall undertake bacteriological testing on all new mains and charge the Contractor a fee for the service.

Should the bacteriological test fail twice, the Contractor shall disinfect the mains at his cost.

19.5.3 Satisfactory Bacteriological Test

The acceptable range for the heterotrophic count shall be 0 – 100 cfu/mL

20.1 Disinfection – General

The disinfection agent shall be a sodium hypochlorite solution or other approved chlorine bearing agent. The dosing rate shall be 20 mg/L with a contact time of 24 hours. The agent shall be added as a water solution to the chlorination point immediately downstream of the stop valve, where the new main connects to the existing main.

22.1 Connections to Existing Mains

All works on the existing reticulation system shall be considered as "live works" and will be constructed by Council at the Contractors cost. The installation details shall comply with Section 4.7 of this document.

23.1 Restoration, General - Add

Restoration shall be carried out progressively as each section of the Works is completed.

The excavated and disturbed area shall be stabilised to minimise wind and water erosion of the restored area.

24 *Work As-Constructed Details*

Recording and certification of “As-Constructed” works shall comply with Section 7.3 of this document

PART 4 STANDARD DRAWINGS

The following table indicates the appropriate use of WSCOA standard drawings

Status of WSCOA Drawings is per the following key.

Use	Use as Miriam Vale Shire Council standard practice (with amendment if necessary as indicated in the Table below)
Not to be Used	The WSCOA drawing is not to be used for design or construction purposes.

Topic	WSCOA Drawing	WSCOA Status
PIPELINE LAYOUT		
Design Layouts, Typical Locality Plan	WAT-1100	
Design Layouts, Typical Site Plan	WAT-1101	IMEAQ Std Drwg R-1010
Typical Mains Construction, Reticulation Main Arrangement	WAT-1102	Thrust blocks shall comply with WAT-1205, WAT-1206 and WAT-1207. Direct tapping of mains is not permitted. All nuts and bolts to be 316 stainless steel
Typical Mains Construction, Distribution and Transfer Mains	WAT-1103	GRP and steel mains not approved
Typical Mains Construction, DN63 PE Cul-de-sac Arrangement	WAT-1104	Maximum No of connections – 8 Maximum length of PE main – 40 m.
Typical Mains Construction, Connection to Existing Mains	WAT-1105	
Property Services, Single Service Main to Meter	WAT-1106	
Property Services, Split Service Main to Meter	WAT-1107	
Property Services, Connection to Main	WAT-1108	

Property Services, Above Ground Meter Assembly Arrangement	WAT-1109	Tracer wire and marker tape required on non-metallic service connections
EMBEDMENT / TRENCHFILL AND RESTRAINTS		
Soil Classification Guidelines and Allowable Bearing Pressures for Anchors and Thrust Blocks	WAT-1200	
Embedment & Trenchfill, Typical Arrangement	WAT-1201	
Standard Embedment, All Pipe Types	WAT-1202	
Special Embedment, Inadequate and Poor Foundation	WAT-1203	Not adopted
Special Embedment, Concrete, Geotextile and Cement Stabilised Systems	WAT-1204	
Thrust Block Details, Concrete Blocks	WAT-1205	Minimum Factor of Safety of 2.5 for design of blocks
Thrust Blocks Details, Timber and Recycled Plastic Blocks	WAT-1206	Timber and recycled plastic thrust blocks are only acceptable for temporary works.
Thrust and Anchor Blocks, Gate Valves and Vertical Bends	WAT-1207	
Restrained Joint System, DN100 to DN375 Mains	WAT-1208	Water Agency approval required for use of restrained joint systems.
Trench Drainage, Bulkheads and Trench Stops	WAT-1209	
Trench Drainage, Typical Systems	WAT-1210	Refer to comments for WAT-1209 Granular trench bedding drainage to be discharged to drainage lines at all low points along alignment.
Buried Crossings, Under Obstructions	WAT-1211	Place scour bend immediately before first bend where the main deflects under

		the creek
Buried Crossings, Major Roadways	WAT-1212	Subject to Water Agency endorsement
Buried Crossings, Railways	WAT-1213	
Buried Crossings, Bored & Jacked Encasing Pipe Details	WAT-1214	
INSTALLATION PRACTICES / STRUCTURES		
Valve & Hydrant Identification, Identification and marker Posts	WAT-1300	
Typical Valve & Hydrant Installation, Valve Arrangement	WAT-1301	
Typical Valve & Hydrant Installation, Hydrants and Air Relief Valves	WAT-1302	Air Vent to be 100 SHS with pressed steel cap, SS insect gauze. Water Agency to provide details.
Typical Surface Fitting Installation, Gate Valve Surface Boxes, Non Trafficable	WAT-1303	
Typical Surface Fitting Installation, Gate Valve Surface Boxes, Trafficable	WAT-1304	
Typical Surface Fitting Installation, Hydrant Surface Boxes Trafficable	WAT-1305	
Typical Appurtenance Installation, Scour Arrangements	WAT-1307	
Typical Appurtenance Installation, Valve Chambers	WAT-1308	
Typical Appurtenance Installation, Pressure Reducing Valves	WAT-1309	
Aerial Crossings, Aqueduct	WAT-1310	
Aerial Crossings, Aqueduct Protection Grille	WAT-1311	
Aerial Crossings, Bridge Crossing Concepts	WAT-1312	
Flanged Joints	WAT-1313	
FABRICATION DETAILS		
Typical Steel Pipe Jointing, Butt Welding of Joints	WAT-1400	
Typical Steel Pipe Jointing, Rubber Ring Joint Spigot Bands	WAT-1401	
Typical Steel Pipe Jointing, Welding Pipe Collars	WAT-1402	

Typical Steel Fabrication, Bends	WAT-1403	
Typical Steel Fabrication, Access Openings for Pipes \geq DN750	WAT-1404	
Typical Steel Fabrication, Dismantling and Flexible Joints	WAT-1405	
Typical Steel Fabrication, Valve Connection Bypass	WAT-1406	
DI Installation, Valve Bypass Arrangement DI and GRP Pipe	WAT-1407	
Joint Corrosion Protection, Cement Mortar Lined Steel Pipe DN300 to DN1200	WAT-1408	
Hydrant Installation Fittings	WAT-1409	

Appendix A

Authorised Products – Water Supply

Item	Requirements	Authorised Manufacturer
Pipe		
PVC	Series 2 Type M & O PN 12	Iplex Tyco Vinidex
DICL	K9 Rubber Ring Jointed Bitumen Coated	Crevet Tyco
PE	PN 12	Iplex Vinidex PPI
Copper		Port Kembla Copper
Fittings		
DI Bends, Tapers, Tees, Branches & Pretapped Connectors	Thermally Bonded Polymeric Coating PN 16	Tyco Crevet Vinidex
DI Mechanical Couplings	Thermally Bonded Polymeric Coating PN 16	Tyco Crevet AVK

Resilient Seated Gate Valves	Thermally Bonded Polymeric Coating PN 16	Tyco AVK Vinidex
Hydrants	Thermally Bonded Polymeric Coating DN 80 Removable Top Cap & Internal Assembly	Tyco AVK Crevet Gatic/Milne Toowoomba Foundary
CI Boxes & Covers	AS 3750.4	Tyco Iplex Gatic/Milne Tellam Crevet
PE Mechanical Fittings		George Fischer Philmac Plasson
Tapping Bands	Gunmetal – positive stops Stainless Steel Bolts	Tyco Gatic/Milne RMC
Ferrules, Ball Valves, Stop Cocks		Tyco Gatic/Milne RMC
Meters – 20 & 25mm		Elster RMC
Meters – 32 & 40mm		Elster
Single Check Detector	Thermally Bonded Polymeric Coating	Tyco

Check Valves		
Marker Tape		Boddington Tapex
Tracer Wire	2mm 316 stainless steel 7/19 construction cable	
PE Sleeving for DI Pipe		Tyco Crevet