WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W101

GENERAL CONSTRUCTION
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WPRC-W101: GENERAL CONSTRUCTION

WPRC-W101.1  COMPLIANCE WITH LEGISLATION

Comply with any relevant legislation including Local Government Ordinances relevant to the Work Under Contract (WUC). Provide adequate supervision of the work to ensure that the legislative requirements are strictly observed.

WPRC-W101.2  PRECEDENCE

The order of precedence, unless the context requires otherwise, is as follows:

1. Project Drawings.
2. Project Scope Statement.
4. Technical Schedules.
5. Special Conditions of Contract.
7. Principal’s Standards.
8. WSAA Codes.
10. International and other industry standards.

WPRC-W101.3  STANDARDS

Unless otherwise specified in the Contract, and where applicable, materials and workmanship shall be in accordance with the relevant WSAA Code in the first instance, followed by any relevant Australian Standard.

A standard applicable to the Works shall be the edition last published 14 days prior to the closing date for tenders unless otherwise specified.

Overseas standards and other standard documents named in the Specification shall be applicable in the same manner as Australian Standards to relevant materials and workmanship.

Copies of any standards quoted or referred to in the Specification shall be kept on the site if so specified.
WPRC-W101.4 DRAWINGS

The location of the various existing structures, features and underground services shown on the Drawings and the dimensions of such, where given, are believed to be correct but do not purport to be absolutely so. They have been shown for the information of the Contractor, and information so given is not to be construed as a representation that such structures or features will be found or encountered as drawn or that such information is complete or accurate. The Principal does not warrant the correctness of such information provided by or on behalf of the Principal. The Contractor shall satisfy itself by such means as it considers appropriate as to the location of all existing structures or features that will be encountered or affected in the performance of the work under the Contract.

The Contractor shall check all Drawings carefully and advise the Superintendent within 14 days of the issue of the Drawings of any discrepancies, errors or omissions and full instructions will be furnished by the Superintendent to the Contractor should any discrepancies, errors or omissions be found.

Although Drawings may have been prepared to scale unless noted otherwise, work shall be based upon dimensions shown on the Drawings and not on dimensions scaled from the Drawings.

WPRC-W101.5 EXISTING SERVICES

Where existing utility services are shown on the Drawings, the Principal does not represent that the information shows completely the existing or planned conditions and does not warrant the correctness of any interpretation, deduction or conclusion shown in these records.

The Contractor shall prove the locations of services prior to construction and comply with all requirements of relevant authorities and utility companies for the protection of and any temporary or permanent relocation of existing services

WPRC-W101.6 TESTING AND SURVEY

All testing and survey as required by the Technical Schedule shall be arranged and carried out by the Contractor and all test results and survey records made available to the Superintendent and Council. The cost of all such testing and survey shall be borne by the Contractor.

WPRC-W101.7 WORKING AREAS

The Principal will not be responsible for the safe-keeping of any of the Contractor’s plant, equipment, tools, materials or other property. The Contractor may provide, and pay for, any security fencing considered necessary around any office, workshop or storage area, subject to the Superintendent’s approval.
If existing fencing is cut or altered by the Contractor, or if there is no existing site fencing, the Contractor shall provide and maintain temporary fencing to the satisfaction of the Superintendent during the Contract to prevent unauthorised entry into the property, and shall reinstate the fencing and remove temporary fencing on completion of the work.

The Contractor shall erect appropriate regulatory, hazard, emergency information and fire signs, in accordance with AS 1319 Safety signs for the occupational environment, at prominent locations around the working areas and temporary site facilities. Signs shall include, but are not limited to: mandatory signs for personal protection such as eye, head and foot protection, and DANGER signs such as “DANGER, Construction Site. No Unauthorised Access”. All words on word-message signs shall be approved by the Superintendent prior to sign manufacture or purchase.

**WPRC-W101.8  CUSTOMER FOCUS**

The Contractor shall have a clear customer focus when carrying out the WUC and shall be pro-active in managing the Works to eliminate any potential causes of complaints. The Contractor is the front line of the Principal’s customer service on this project and the Contractor's performance impacts greatly on the public's perception of the Principal. Therefore, the Contractor shall carry out and complete the WUC in a manner that results in minimal inconvenience or impact on the customers, and preserves or enhances The Principal’s reputation with customers.

The Contractor shall ensure that all their employees and Sub-Contractors are suitably trained and understand the requirements of this document. The Contractor shall provide adequate supervision to ensure their staffs complies with this Specification.

**WPRC-W101.9  SMOOTH JUNCTIONS**

Construction work carried out under this Contract adjacent to or adjoining existing works, shall make smooth junctions with the existing work.

**WPRC-W101.10  SETTING OUT THE WORKS**

The Superintendent will provide Permanent Marks as shown on the Drawings. The Superintendent will also establish Bench Marks related to the Level Datum.

Before any of the given survey marks on the base lines or the various control lines are affected by the Works, the Contractor shall transfer such survey marks to side positions clear of operations and shall note, and inform the Superintendent in writing, of the extent of such movement.
The Contractor shall give the Superintendent not less than two full working days' notice of the intention to perform any portion of the relocation of survey control, establishment of recovery pegs, or setting out or levelling, so that suitable arrangements can be made for checking of the work by the Superintendent. If no such notification is given and a control mark is disturbed or destroyed, then the cost of re-establishing the control shall be borne by the Contractor.

The Contractor shall provide and fix adequate recovery pegs in suitable locations adjacent to the elements of work to enable location and construction to be checked.

All pegs and profiles placed by the Contractor shall be removed on completion of work unless otherwise directed by the Superintendent.

**WPRC-W101.11 SITE MEETINGS**

Regular site meetings will be held for the purpose of discussion of the progress and co-ordination of the WUC and any matters of doubt regarding the intent or interpretation of the Drawings or the Specification. The Contractor shall arrange for relevant sub-contractors or their responsible representatives to be present at these meetings. The meetings will be held at a time nominated by the Superintendent.

The Superintendent shall also give the Principal 48 hours notice of the date, time and location of the meetings. A representative of the Principal may attend these meetings.

The Superintendent or Superintendent’s Representative shall chair site meetings, keep minutes of the proceedings and shall provide copies of the minutes for the Contractor, all present at the meeting and others concerned with the matters discussed.

**WPRC-W101.12 WORK AS-EXECUTED DRAWINGS**

The Contractor shall supply the Superintendent with fully marked-up and certified Work-as-Executed Drawings for the whole of the Contract prior to issue of the Final Certificate. Electronic copies of the Contract Drawings will be supplied by the Principal in Autocad DWG format (unless noted otherwise) free of charge for this purpose. Work As-Executed drawings shall be signed off by the Contractor and a qualified surveyor or engineer. Work As-Executed survey shall be to the Map Grid of Australia (MGA) and Australian Height Datum (AHD).

**WPRC-W101.13 PRINCIPAL SUPPLIED ITEMS**

Items listed in the Project Scope to be supplied by the Principal will be supplied, delivered and unloaded by the Principal free of cost to the Contractor at points to be nominated. The Contractor shall give the Superintendent notice of the time delivery of Principal Supplied Items are required.
If any Principal Supplied Item is found to be damaged or defective the Contractor shall so inform the Superintendent within 2 days of taking delivery of such item. If the Contractor does not report damage or defect, it shall be deemed that the item was free from damage or defect when received. The Contractor shall then be responsible for any replacement or making good, as may be directed by the Superintendent.

The Contractor shall be responsible for the storage, protection and insurance of all Principal Supplied Items received.

**WPRC-W101.14 SCHEDULED RATES**

Requirements in respect of all matters specified in this General Specification shall be considered as part of the WUC and unless specified otherwise, may not be provided with specific scheduled rates in the Schedule in respect thereof. Where no specific scheduled rates are detailed, these requirements shall be deemed to be included in the other Contract scheduled rates.

**WPRC-W101.15 QUALITY ASSURANCE**

The Contractor shall undertake Quality Assurance in accordance with the General Conditions and Special Conditions of Contract.

**WPRC-W101.16 WORKPLACE HEALTH AND SAFETY**

The Contractor shall undertake Workplace Health & Safety in accordance with the General Conditions and Special Conditions of Contract and all Legislative requirements. All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Contract price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor's activities for the duration of the Contract.
The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the Contract price.
WPRC-W101.17  PROTECTION OF THE ENVIRONMENT

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of all relevant environmental legislation, any Impact Statement and Assessment Report or Review of Environmental Factors for the subject matter of the WUC, the conditions of approval (if any) imposed by the Environment Protection Authority and/or consent authority for the Works. No variation in costs or extensions of time will be considered due to these requirements.

The Contractor shall plan and carry out the Works to avoid erosion, contamination and sedimentation of the site and its surroundings.

Herbicides and other toxic chemicals shall not be used on the site without the prior written approval of the Superintendent.

WPRC-W101.18  DRAINAGE

The Contractor shall provide for the effectual diversion of surface water from the Works and provide and ensure proper flushing for storm and subsoil water across and beyond the Works at all times. The flow of stormwater and drainage along existing gutters and water tables shall not be interrupted.

The Contractor shall provide efficient pumping equipment on site and shall keep trenches and excavations dewatered at all times during construction.

All permanent retention basins, and temporary erosion and sedimentation control shall be completed prior to commencement of earthworks.

WPRC-W101.19  EROSION AND SEDIMENT CONTROL

All proper precautions shall be taken by the Contractor to prevent the erosion of soil by wind or water from land used or occupied by the Contractor and to prevent the deposition of soil in watercourses during execution of work under the Contract. Existing soil binding vegetation and established ground surfaces shall not be disturbed unless necessary for the purpose of the Works.

The Contractor shall design, supply, install, maintain and operate drainage systems to remove surface run-off and ground water from excavations from the Site. The Contractor shall implement wherever practicable the recommendations set out in the Landcom publication Managing Urban Stormwater: Soils and Construction (2004).

All surface run-off and ground water from excavations shall be collected and conveyed to settling ponds and oil traps as required, prior to discharge into the environment. All discharges to watercourses or drains shall meet the relevant requirements of the Environment Protection Authority and Council.
The Contractor shall ensure that all water is discharged in a condition and manner so as not to cause erosion or pollution, or nuisance to other persons within or adjacent to the Site.

The Contractor shall prepare and submit to the Superintendent an Erosion and Sediment Control Plan prior to the commencement of the Works. This plan shall include the management of all erosion and sediment risks including:

A. Exposure of soils to erosion by wind and/or water due to the removal of vegetation, pavement, concrete or other surface coverings.
B. Soil run-off from stockpiles or disturbed areas polluting waterways or drains.
C. Pollution of soils and groundwater by seepage of liquid wastes.

If in the opinion of the Superintendent the Contractor’s operations cause erosion hazards, the Contractor shall at its own cost undertake soil conservation methods in these areas when directed by the Superintendent. Soil conservation measures shall include, but not be limited to, stabilisation of embankment slopes by grassing or similar means to control erosion and the construction of cut-off drains to prevent soil deposition outside the Site.

**WPRC-W101.20 DUSTR AND MUD**

The Contractor shall not cause a dust nuisance on site, and shall take positive action to prevent dust from blowing off the site that may cause nuisance or safety issues to the Principal’s employees, neighbours and the general public. The Contractor shall minimise the impact that his activities have on site by providing appropriate measures such as watering, sprinklers or other approved dust suppression methods to keep the dust down. The Contractor shall control the speed of traffic, and shall arrange his works so that the wind does not cause a dust problem.

The Contractor shall not traffic mud or spoil on to roads that belong to the Council or the Principal. The Contractor shall promptly remove any reported deposits on to roadways. The Contractor shall also ensure that trucks are not overloaded, and that they are filled in a manner so debris cannot fall from the truck during transport and end up on roadways.

**WPRC-W101.21 BLASTING**

Blasting will not be permitted without the specific approval of the Superintendent, relevant Regulator and affected Owners of assets within the vicinity.

Where approval for blasting is granted, the Contractor shall prepare a blasting plan that includes management of the blasting and means to be used to satisfy the requirements of AS 2187 and the approving parties.
The Contractor shall only use plant that has effective residential class silencers fitted to all engine exhausts and fitted engine covers. Ensure that the sound pressure level for any piece of equipment, or operation shall be within the limits prescribed by AS 2436.

The Contractor shall ensure that noise emanating from the construction site when measured at any noise sensitive location (such as a residential premise), as determined by the Environment Protection authority’s publication Environmental Noise Control Manual, shall not exceed an assigned L10 sound pressure level threshold (noise level exceeded for 10 per cent of the sample time). The intent of this requirement is to avoid excessive noise and long periods of elevated noise that is reasonably anticipated to annoy or adversely affect the adjacent community.

Operational hours of plant, including the entry and/or departure of heavy vehicles, shall be restricted to 7am to 6pm Monday to Friday, 7am to 1pm on Saturday and at no times on Sundays or Public Holidays. Work outside of the hours specified shall not be undertaken without the prior approval of the Superintendent.

The Contractor will be responsible for any damage and compensation payments as a result of non-observance of the above requirements. No claim by the Contractor arising out of these requirements will be considered by the Superintendent.

It is the intent of this Specification that ground vibration levels, transmitted from operating items of plant in the vicinity of residential premises shall not exceed levels that are close to the lower level of human perception inside the premise nor will cause structural damage to the building. Practices and vibration thresholds acceptable shall be determined in accordance with current Statutory Regulations.

Ground vibrations generated by construction works shall not exceed a peak particle velocity ($V_r$ max) limit of 5 mm/s when measured within one metre of any residential premise.

The Contractor shall be responsible for any damage and compensation payments as a result of non-observance of the above requirements. No claim by the Contractor will be considered by the Superintendent.

The Contractor shall provide, operate and maintain adequate fire fighting equipment for the protection of the WUC and its Constructional Plant. The Contractor shall take all necessary measures to prevent fire during the execution of work under the Contract and damage to or destruction by fire of the vegetation in and surrounding the area of the Site arising from the Contractor's operations.
If any of the Contractor’s Constructional Plant is powered by an internal combustion engine, then that Plant shall be fitted with fully working and efficient spark emission control devices in accordance with AS 1019, and carry a charged fire extinguisher.

The Contractor shall comply with the requirements of the Rural Fires Act and Regulations made there under, and shall ensure that all persons on the Site observe these requirements.

The Contractor shall take notice, and implement appropriate work strategies, of any announcements by the Rural Fire Service, particularly the notification of the annual Fire Danger Period, days of Total Fire Ban days, and Fire Danger Ratings of Severe, Extreme and Catastrophic.

**WPRC-W101.25  PRESERVATION OF FLORA AND FAUNA**

The Contractor shall not destroy, remove or clear trees and vegetation without the prior written permission of the Superintendent.

The Contractor shall take such measures as are necessary to prevent its employees and subcontractors from hunting, disturbing any natural habitat, capturing or destroying animals and birds within the Site and all neighbouring areas and along the accesses to the Site.

Whenever clearing is required as part of the WUC, the extent of clearing shall be subject to approval of the Superintendent. All cleared material including trees stumps, roots, brush, rubbish, and any objectionable matter shall be disposed of in a lawful manner. Burning of material will not be permitted unless otherwise approved in writing by the Superintendent.

**WPRC-W101.26  TREATMENT OF LIQUID WASTES**

The Contractor shall inspect all plant and equipment to be used for oil and fuel leakage before it enters the Site, and shall inspect all plant and equipment at regular intervals (at least daily) during the period that they are on the Site.

In order to minimise the risk of polluting a watercourse all servicing and fuelling of the Contractor’s plant and equipment shall be carried out at locations remote from any watercourse.

Under no circumstances shall the Contractor allow any plant or equipment to enter any watercourse or allow it to continue to operate, if the plant or equipment is found to be leaking oil or fuel. Entry of oil, grease or fuel into any watercourse is prohibited. Drainage from any area likely to be contaminated as such shall be effectively diverted to a suitable collection point. The Contractor shall provide, operate and maintain adequate facilities for the collection of leaking fuels, lubricants, oils, greases, and the like, and for the transportation and lawful disposal of these materials off the Site.

If pollution of the soil occurs from the Contractor’s plant and equipment or spillage of any contaminant, then all contaminated soil shall be removed from the Site and disposed of as in accordance with the requirements of the EPA.
WPRC-W101.27  WASH DOWN OF PLANT AND EQUIPMENT

To assist in controlling the spread of soil borne diseases and fungi, all plant and equipment required for the construction of the WUC shall be washed down before any such plant or equipment is brought into the vicinity of the Site. Prior to commencement of the WUC, all plant and equipment may be inspected by the Superintendent upon arrangement with the Contractor.

The wash-down of plant and equipment by the Contractor shall remove all soil accumulated on the plant or equipment. The Contractor shall also wash down all plant and equipment before the plant or equipment leaves the Site.

WPRC-W101.28  DISPOSAL OF HAZARDOUS MATERIAL

All hazardous materials known or identified at the time of tendering that are to be removed from the Site shall be carefully handled, loaded, transported and disposed of in accordance with EPA requirements and any other legislative requirements, which may be applicable to the hazardous material.

The Contractor shall properly identify any other hazardous material encountered during the execution of work under the Contract prior to handling. The Superintendent will direct the Contractor on the special provisions for removal and disposal of the hazardous material by the issue of a variation under the Contract.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W102

CONSTRUCTION OF WATER RETICULATION
## TECHNICAL SCHEDULE WPRC-W102 – CONSTRUCTION OF WATER RETICULATION

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WPRC-W102: CONSTRUCTION OF WATER RETICULATION

WPRC-W102.1  SCOPE

This Specification applies to the construction of potable water reticulation mains up to and including DN 300mm after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W102.2, unless specified otherwise herein.

WPRC-W102.2  REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1111  ISO metric hexagon commercial bolts and screws
AS 1112  ISO metric hexagon nuts
AS 1214  Hot dipped galvanised coating on threaded fasteners
AS 1237  Plain washers for metric bolts, screws and nuts for general purposes
AS 1281  Cement mortar lining of steel pipe and fittings
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1477  PVC Pipes and fittings for pressure applications
AS 1627  Metal finishing
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2280  Ductile iron pressure pipe and fittings
AS 2566  Buried flexible pipelines
AS 2638  Cast iron sluice valves for waterworks purposes
AS 3952  Spring Hydrants for Waterworks Purposes
AS 3680  Polythene Sleeving for Ductile Iron Pipes
AS 3681  Application of polyethylene for ductile iron piping
AS 4020  Testing of products for use in contact with drinking water
AS 4087  Metallic Flanges for Waterworks Purposes
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4158  Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4441  Oriented PVC (PVC-O) pipes for pressure applications
AS 4680  Hot dip galvanised (zinc) coatings on fabricated ferrous articles
AS 4765  Modified PVC (PVC-M) pipes for pressure applications
AS 4791  Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS 4792  Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
AS 4794  Non-return valves – swing check and tilting disc

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01  Polyethylene Pipeline Code
WSA03  Water Supply Code of Australia
N/A  WSAA Product Specifications

**WPRC-W102.3  STANDARDS**


**WPRC-W102.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 12.2 and 12.3 of WSA03-2011.

All pipe, fittings and associated mechanical equipment shall be suitable for the conveyance of potable water and shall meet the requirements of AS 4020.

**WPLR-W102.5  POLYVINYLCHLORIDE (PVC) PIPE**

PVC pipe shall be either:
- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.
All PVC pipe shall be:

- Minimum pressure class PN18.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured blue for potable water.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

**WPRC-W102.6  DUCTILE IRON PIPE AND FITTINGS**

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200 and cement lined in accordance with AS 1281 (DICL).

Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Ductile iron pipes and fittings shall be:

- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Externally coated with a bituminous or synthetic resin coating to AS 2280.
WPRC-W102.7 POLYETHYLENE (PE) PIPE AND FITTINGS

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:

- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN16.
- Coloured black with blue stripes for potable water
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

WPRC-W102.8 STOP VALVES

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.

WPRC-W102.9 HYDRANTS

Hydrants shall be spring hydrants compliant with WSAA Product Specification WSA PS-267 and shall be:

- Manufactured in accordance with AS 3952.
- Minimum pressure class PN16.
- Provided with external and internal coating in accordance with AS 4158.
- Installed with a hydrant riser as required so that the face of the hydrant is between 75mm and 225mm below the top of the underside of the hydrant surface cover.

WPRC-W102.10 NON-RETURN VALVES

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:

- Manufactured in accordance with AS 4794.
- Minimum pressure class PN16.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.
WPRC-W102.11  PRESSURE REDUCING VALVES

Pressure reducing valves shall be of a type, make and model as approved by the Principal and shall be installed in accordance with the manufacturer’s instructions. Pressure reducing and associated valves shall be installed in a below-ground pit.

WPRC-W102.12  MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W102.13  FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W102.14  FASTENERS

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W102.15  GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

WPRC-W102.16  TAPPING BANDS

Mechanical tapping bands for connecting property services to reticulation mains shall be compliant with WSAA Product Specification WSA PS-310.

WPRC-W102.17  METALWORK

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable.
WPRC-W102.18 CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379.

WPRC-W102.19 TRENCH FILL MATERIAL

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_D$) of not less than 95%.

WPRC-W102.20 EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W102.21 LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves and hydrants are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W102.22 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.

The maximum cover for water reticulation mains shall be 1500mm unless otherwise approved by the Superintendent.
WPRC-W102.23 CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor's responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W102.24 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 13 of WSA03-2011. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

WPRC-W102.25 ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.
Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W102.26 BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 14 of WSA03-2011.

**WPRC-W102.27 LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 15 of WSA03-2011.

Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation, the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer's written instructions, or as directed by the Superintendent.

Cutting of asbestos cement (AC) pipes is not permitted. The AC pipe must be excavated to the nearest pipe collars and the collars cracked. Once the collars are removed, a new section of DICL pipe shall be installed by use of gibault joints. The AC pipe materials shall be disposed of safely and in accordance with relevant legislation.
WPRC-W102.28 TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (ie 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[ \text{Trenchstop spacing (m)} = \frac{100}{\text{Grade (\%\)}} \]

WPRC-W102.29 BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[ \text{Bulkhead spacing (m)} = \frac{\text{L}}{\text{Grade (\%\)}} \text{ where L = 80 x pipe length (m) (450m max)} \]
\[ \text{Where L > 100m also construct intermediate trench stops at spacing < 100/grade (\%\)} \]

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[ \text{Bulkhead spacing (m)} = \frac{100}{\text{Grade (\%\)}} \]

WPRC-W102.30 WRAPPING

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.

WPRC-W102.31 VALVE CHAMBERS

Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25 mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.
CONTRACT NO.  WPRC-W102.32  THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA03-2011 clause 15.7.

Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

WPRC-W102.33  CONCRETE ENCASEMENT

Concrete encasement shall be undertaken in accordance with WSA03-2011 clause 16.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

WPRC-W102.34  TRENCH FILL

Trench fill shall be undertaken in accordance with WSA03-2011 Clause 17.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause WPRC-W102.19. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density radio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.
Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W102.19. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

WPRC-W102.35 BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA03-2011 Clause 15.15.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

WPRC-W102.36 MARKERS

Opposite each stop valve, scour valve, air valve and hydrant the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the hydrant is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.

The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.
Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centreline of the roadway.

WPRC-W102.37 SWABBING

Swabbing of constructed pipelines in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.

WPRC-W102.38 COMPACtion TESTING

Compaction testing shall be carried out in accordance with WSA03-2011 Clause 19.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

WPRC-W102.39 HYDROSTATIC PRESSURE TESTING

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.
Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
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<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
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<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
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<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

**WPRC-W102.40 DISINFECTION**

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all new pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

**WPRC-W102.41 CONNECTION TO EXISTING WATER MAINS**

The Principal shall determine whether connections to existing live water pipelines may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.
For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in a case where the pipes are greater than DN150 in size.

**WPRC-W102.42  RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA03-2011 Clause 23 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

**WPRC-W102.43  WORK AS-EXECUTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked “As-Executed” with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and AutoCAD DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.
If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR .................................................................

CONTRACT .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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Contractor ................................................................................................. (Signature)

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Received by - Superintendent ........................................................................ (Signature)

........................................................................................................ (Date)

- Principal ..................................................................................................... (Signature)

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CONTRACTOR ..........................................................................................................
CONTRACT ............................................................................................................

Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2

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<th>Test Finish Time</th>
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<th>Actual Make-Up Water</th>
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Permitted make-up water is determined by the formula Q (L/h) = 0.14LDH where L = pipeline length (km), D = pipeline diameter (m) and H = average test head over pipeline (m).

Witnessed by Superintendent ...........................................................................................................(Signature)
                                                                                             ..........................................................Date

Contractor .................................................................................................................................... (Signature)
                                                                                             ..........................................................Date

CONTRACTOR .......................................................... 

CONTRACT ...........................................................

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION ..............................................................

TEST DATE .................................................. WATER TEMPERATURE..............................

TEST START TIME .......................................... TEST FINISH TIME ....................................

TEST PRESSURE ................................................

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<tr>
<td>Make-up water added L (ΔV)</td>
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Permitted make-up water is determined by the formula $V_{all} (L/h) = 0.14LDH$ where $L =$ pipeline length (km), $D =$ pipeline diameter (m) and $H =$ average test head over pipeline (m).

ALLOWABLE MAKE-UP ($V_{all}$) .................................

$0.55 \times \Delta V_{(3h-2h)}$ at 3rd hour + ALLOWABLE MAKE-UP ($V_{all}$) .................................

$\Delta V_{(5h-4h)}$ at 5th hour .........................................

PASS/FAIL ..................................................................

Witnessed by Superintendent .......................................................... (Signature)

........................................................................................................... Date

Contractor .................................................................................................. (Signature)

........................................................................................................... Date
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W103

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APPENDIX A – HYDROSTATIC TESTING FORMS................................................................................ 20
WPRC-W103: CONSTRUCTION OF WATER TRUNK MAINS

WPRC-W103.1 SCOPE

This Specification applies to the construction of potable water trunk mains DN 300mm and above after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W103.2, unless specified otherwise herein.

WPRC-W103.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

| AS 1111 | ISO metric hexagon commercial bolts and screws |
| AS 1112 | ISO metric hexagon nuts |
| AS 1214 | Hot dipped galvanised coating on threaded fasteners |
| AS 1237 | Plain washers for metric bolts, screws and nuts for general purposes |
| AS 1281 | Cement mortar lining of steel pipe and fittings |
| AS 1289 | Methods of testing soils for engineering purposes |
| AS 1379 | Specification and supply of concrete |
| AS 1477 | PVC Pipes and fittings for pressure applications |
| AS 1579 | Arc-welded steel pipes and fittings for water and wastewater |
| AS 1627 | Metal finishing |
| AS 1646 | Rubber joint rings for water supply, sewerage and drainage purposes |
| AS 2032 | Code of Practice for installation of UPVC pipe systems |
| AS 2280 | Ductile iron pressure pipe and fittings |
| AS 2566 | Buried flexible pipelines |
| AS 2638 | Cast iron sluice valves for waterworks purposes |
| AS 3952 | Spring Hydrants for Waterworks Purposes |
| AS 3680 | Polythene Sleeving for Ductile Iron Pipes |
| AS 3681 | Application of polyethylene for ductile iron piping |
| AS 4020 | Testing of products for use in contact with drinking water |
AS 4087  Metallic Flanges for Waterworks Purposes
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4158  Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4321  Fusion bonded medium-density polyethylene coating and lining for pipes and fittings
AS 4441  Oriented PVC (PVC-O) pipes for pressure applications
AS 4680  Hot dip galvanised (zinc) coatings on fabricated ferrous articles
AS 4765  Modified PVC (PVC-M) pipes for pressure applications
AS 4791  Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS 4792  Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
AS 4794  Non-return valves – swing check and tilting disc
AS 4795  Butterfly valves for waterworks purposes
AS 4956  Air valves for water supply

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01  Polyethylene Pipeline Code
WSA03  Water Supply Code of Australia
WSAA Product Specifications

**WPRC-W103.3  STANDARDS**


**WPRC-W103.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 12.2 and 12.3 of WSA03-2011.

All pipe, fittings and associated mechanical equipment shall be suitable for the conveyance of potable water and shall meet the requirements of AS 4020.
CONSTRUCTION OF WATER TRUNK MAINS

WPRC-W103.5  POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be either:

- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.

All PVC pipe shall be:

- Minimum pressure class PN18.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured blue for potable water.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

WPRC-W103.6  DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200 and cement lined in accordance with AS 1281 (DICL).

Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Ductile iron pipes and fittings shall be:

- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Externally coated with a bituminous or synthetic resin coating to AS 2280.
WPRC-W103.7  MILD STEEL CEMENT LINED (MSCL) PIPE AND FITTINGS

MSCL pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:
- Manufactured in accordance with AS 1579.
- Cement mortar lined in accordance with AS 1281.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

WPRC-W103.8  POLYETHYLENE (PE) PIPE AND FITTINGS

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:
- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN16.
- Coloured black with blue stripes for potable water
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

WPRC-W103.9  STOP VALVES – SLUICE VALVES

Unless noted otherwise, stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:
- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
**WPRC-W103.10 STOP VALVES – BUTTERFLY VALVES**

Where specified, butterfly valves shall be compliant with WSAA Product Specification WSA PS-263 and shall be:

- Manufactured in accordance with AS 4795.
- Minimum pressure class PN16.
- Double flanged unless noted otherwise.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Installed with trunnions horizontal and have a manual gearbox actuator (fully enclosed) suitable for buried service that can be operated from the surface.
- Provided with suitable stops to prevent overtravel of the disc beyond fully open and fully closed position.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.

**WPRC-W103.11 HYDRANTS**

Hydrants shall be spring hydrants compliant with WSAA Product Specification WSA PS-267 and shall be:

- Manufactured in accordance with AS 3952.
- Minimum pressure class PN16.
- Provided with external and internal coating in accordance with AS 4158.
- Installed with a hydrant riser as required so that the face of the hydrant is between 75mm and 225mm below the top of the underside of the hydrant surface cover.

**WPRC-W103.12 AIR VALVES**

Air valves shall be compliance with WSAA Product Specification WSA PS-265 and shall be:

- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with potable water.
- Installed with an isolation valve.
- Minimum diameter DN80mm.
WPRC-W103.13 NON-RETURN VALVES

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:

- Manufactured in accordance with AS 4794.
- Minimum pressure class PN16.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.

WPRC-W103.14 PRESSURE REDUCING VALVES

Pressure reducing valves shall be of a type, make and model as approved by the Principal and shall be installed in accordance with the manufacturer’s instructions. Pressure reducing and associated valves shall be installed in a below-ground pit.

WPRC-W103.15 MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W103.16 FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W103.17 FASTENERS

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W103.18 GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

WPRC-W103.19 TAPPING BANDS

Mechanical tapping bands for connecting property services to reticulation mains shall be compliant with WSAA Product Specification WSA PS-310.
WPRC-W103.20 METALWORK

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable.

WPRC-W103.21 CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379.

WPRC-W103.22 TRENCH FILL MATERIAL

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_0$) of not less than 95%.

WPRC-W103.23 EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W103.24 LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves and hydrants are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W103.25 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.
The maximum cover for water reticulation mains shall be 1500mm unless otherwise approved by the Superintendent.

**WPRC-W103.26 CROSSINGS**

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor's responsibility to complete written notification to the Authority of the intention to carry out the work.

**WPRC-W103.27 EXCAVATION**

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 13 of WSA03-2011. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRC103.28 ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor’s expense and the Contractor shall not be entitled to any extension of time due to such delay.
Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

WPRC-W103.29 BEDDING FOR PIPES

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 14 of WSA03-2011.

WPRC-W103.30 LAYING OF PIPES

Laying of pipes shall be undertaken in accordance with Clause 15 of WSA03-2011.

Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation, the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer’s written instructions, or as directed by the Superintendent.

Cutting of asbestos cement (AC) pipes is not permitted. The AC pipe must be excavated to the nearest pipe collars and the collars cracked. Once the collars are removed, a new section of DICL pipe shall be installed by use of gibault joints. The AC pipe materials shall be disposed of safely and in accordance with relevant legislation.
WPRC-W103.31 TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

WPRC-W103.32 BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} (\%)} \quad \text{where} \quad L = 80 \times \text{pipe length (m)} \quad (450\text{m max})
\]

Where \( L > 100\text{m} \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

WPRC-W103.33 WRAPPING

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.

WPRC-W103.34 VALVE CHAMBERS

Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.

WPRC-W103.35 THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA03-2011 clause 15.7.
Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

**WPRC-W103.36 CONCRETE ENCASEMENT**

Concrete encasement shall be undertaken in accordance with WSA03-2011 clause 16.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

**WPRC-W103.37 TRENCH FILL**

Trench fill shall be undertaken in accordance with WSA03-2011 Clause 17.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause WPRC-W103.22. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.
Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W103.22. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

**WPRC-W103.38 BORED PIPES UNDER ROAD, DRIVEWAYS AND ELSEWHERE**

Trenchless construction of pipes shall be undertaken in accordance with WSA03-2011 Clause 15.15.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

**WPRC-W103.39 PROTECTION**

Where MSCL pipework is used, cathodic protection shall be installed as specified on the detail design. All cathodic protection works shall be installed by an experienced corrosion protection contractor.

All connections between dissimilar metals shall be insulated to ensure that dissimilar metals are electrically separated.

**WPRC-W103.40 MARKERS**

Opposite each stop valve, scour valve, air valve and hydrant the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the hydrant is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.
The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.

Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centerline of the roadway.

**WPRC-W103.41 SWABBING**

Swabbing of constructed pipelines in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.

**WPRC-W103.42 COMPACTION TESTING**

Compaction testing shall be carried out in accordance with WSA03-2011 Clause 19.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W103.43 HYDROSTATIC PRESSURE TESTING**

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.
Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

**WPRC-W103.44 DISINFECTION**

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all new pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

**WPRC-W103.45 CONNECTION TO EXISTING WATER MAINS**

The Principal shall determine whether connections to existing live water pipelines may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.
For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in a case where the pipes are greater than DN150 in size.

**WPRC-W103.46 RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA03-2011 Clause 23 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel or use trenchless methods to construct under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

**WPRC-W103.47 WORK AS-EXECUTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.
Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and AutoCAD DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR .................................................................

CONTRACT .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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<tbody>
<tr>
<td>A</td>
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Contractor .................................................................................................................................... (Signature)

.................................................................................................(Date)

Received by - Superintendent .................................................................................................. (Signature)

.................................................................................................(Date)

- Principal .................................................................................................................. (Signature)

.................................................................................................(Date)

CONTRACTOR …………………………………………………………………………..

CONTRACT …………………………………………………………………………..

Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2

<table>
<thead>
<tr>
<th>Section</th>
<th>Required Test Pressure</th>
<th>Actual Test Pressure</th>
<th>Test Start Time</th>
<th>Test Finish Time</th>
<th>Permitted Make-Up Water</th>
<th>Actual Make-Up Water</th>
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<tbody>
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<td>A</td>
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Permitted make up water is determined by the formula \( Q \ (\text{L/h}) = 0.14LDH \) where \( L \) = pipeline length (km), \( D \) = pipeline diameter (m) and \( H \) = average test head over pipeline (m).

Witnessed by Superintendent ………………………………………………………………………………………………(Signature)

…………………………………………………………………………………………….Date

Contractor ……………………………………………………………………………………………………..(Signature)

…………………………………………………………………………………………….Date

CONTRACTOR .................................................................................................................................

CONTRACT .................................................................................................................................

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION .........................................................................................................................................

TEST DATE ............................................................... WATER TEMPERATURE.................................

TEST START TIME ........................................................... TEST FINISH TIME ..........................................

TEST PRESSURE .................................................................................................................................

<table>
<thead>
<tr>
<th>Section</th>
<th>1 hour</th>
<th>2 hours</th>
<th>3 hours</th>
<th>4 hours</th>
<th>5 hours</th>
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<tr>
<td>Make-up water added L (ΔV)</td>
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</table>

Permitted make-up water is determined by the formula \( V_{all} \) (L/h) = 0.14LDH where \( L \) = pipeline length (km), \( D \) = pipeline diameter (m) and \( H \) = average test head over pipeline (m).

ALLOWABLE MAKE-UP (\( V_{all} \)) .................................................

0.55 x \( \Delta V_{(3h-2h)} \) at 3\(^{rd}\) hour + ALLOWABLE MAKE-UP (\( V_{all} \)) .................................................

\( \Delta V_{(5h-4h)} \) at 5\(^{th}\) hour .................................................

PASS/FAIL .................................................................

Witnessed by Superintendent ...........................................................................................................(Signature)

..........................................................................................................................Date

Contractor .....................................................................................................................................(Signature)

..........................................................................................................................Date
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W104

CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION
### TECHNICAL SCHEDULE WPRC-W104 – CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION

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WPRC-W104: CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION

WPRC-W104.1 SCOPE

This Specification applies to the construction of gravity sewerage reticulation pipes (sewers) up to and including DN300mm, after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W104.2, unless specified otherwise herein.

WPRC-W104.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

**Australian Standards**

AS 681  Elastomeric seals
AS 1260  PVC-U pipes and fittings for drain, waste and vent application
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741  Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2566  Buried flexible pipelines
AS 2758  Aggregates and rock for engineering purposes
AS 3879  Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996  Access covers and grates
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4198  Precast concrete access chambers for sewerage applications
AS 5065  Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

- WSA01 Polyethylene Pipeline Code
- WSA02 Gravity Sewerage Code of Australia
- N/A WSAA Product Specifications
- WSA 114 Concrete Special Class
- WSA 137 Maintenance Shafts and Maintenance Chambers for Sewerage

**International Standards**

- EN 295 Vitrified clay pipe systems for drains and sewers. Requirements for pipes, fittings and joints
- ATSM C990M-09 Standard specification for joints for concrete pipe, manholes and precast box sections using preformed flexible joint sealants (metric)

**WPRC-W104.3 Standards**

Construction of the Work Under Contract (WUC) shall be undertaken in accordance with WSA02-2014 Gravity Sewerage Code of Australia, Part 2: Construction.

**WPRC-W104.4 Delivery, Transportation, Handling and Storage of Materials**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 13.2 and 13.3 of WSA02-2014.

**WPRC-W104.5 Polyvinylchloride (PVC) Pipe**

PVC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-230 and shall be:

- Unplasticised PVC (PVC-U) pipes for non-pressure applications.
- Manufactured in accordance with AS 1260.
- Minimum stiffness class SN8 for DN150 mm and above.
- Minimum stiffness class SN10 for DN100 mm.
- Either rubber ring jointed complying with AS 1646 or solvent cement jointed complying with AS 3879.
- Installed in accordance with AS 2032.
WPRC-W10.4.6 VITRIFIED CLAY (VC) PIPE AND FITTINGS

VC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:

- Manufactured in accordance with EN 295 or AS 1741.
- Minimum crushing strength of 34 kN/m for DN150 mm.
- Minimum class 160 for DN200 - 250 mm.
- Minimum class 120 for DN300 mm.
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

WPRC-W104.7 POLYPROPYLENE (PP) PIPE AND FITTINGS

PP pipes and fittings shall be compliant with WSAA Product Specification WSA PS-240 and shall be:

- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

WPRC-W104.8 POLYETHYLENE (PE) PIPE AND FITTINGS

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.

WPRC-W104.9 ACCESS COVERS

Access covers shall be compliant with WSAA Product Specification WSA PS-290 and shall be:

- Manufactured in accordance with AS 3996.
- Class D unless stated otherwise on the Drawings.
- Circular DN600 mm unless stated otherwise on the Drawings.
- Infilled with concrete (where required) in accordance with AS 3996. Concrete infill shall be a minimum of N32 and have a cement content of 400 kg/m³. Concrete infill shall be vibrated during installation to eliminate air pockets.
- Gas and water tight.
- Greased using approved sealing grease on all metal to metal seals after installation.
- Installed with vegetation rings where access covers are not located in a paved or sealed area.
WPRC-W104.10  STEP IRONS AND LADDERS

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

WPRC-W104.11  MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W12  MAINTENANCE CHAMBERS

Where maintenance chambers are permitted and specified on the Drawings, these shall be either approved:

- Concrete maintenance chambers compliant with WSAA Product Specification WSA PS-331.
- PP maintenance chambers compliant with WSAA Product Specification WSA PS-337.
- PE maintenance chambers compliant with WSAA Product Specification WSA PS-338.

Maintenance chambers shall have a nominal riser size between DN450 mm and DN600 mm and shall be compliant with WSA 137.
**WPRC-W104.13 MAINTENANCE SHAFTS**

Where maintenance shafts are permitted and specified on the Drawings, these shall be either approved:

- PE maintenance shafts compliant with WSAA Product Specification WSA PS-322.
- PP maintenance shafts compliant with WSAA Product Specification WSA PS-341.

Maintenance shafts shall have a nominal riser size between DN225 mm and DN375 mm and shall be compliant with WSA 137.

**WPRC-W104.14 CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

**WPRC-W104.15 TRENCH FILL MATERIAL**

Trench fill in trafficable areas shall be 20 mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio (R\(_0\)) of not less than 95%.

**WPRC-W104.16 EMBEDMENT MATERIAL**

Embedment material shall be of the type and size as specified on the Drawings or as otherwise approved by the Superintendent.

- Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
- Embedment/5mm minus fine crushed rock shall be compliance with WSAA Product Specification WSA PS-361.
- Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.
- Well graded crushed rock shall be compliant with WSAA Product Specification WSA PS-362 and shall be of the nominal size specified on the Drawings.
- Single size crushed rock shall be compliant with WSAA Product Specification WSA PS-351 and shall be of the nominal size specified on the Drawings.
Careful selection of embedment material size is required where ribbed pipes such as PP are used. Manufacturer’s recommendations should be sought and the maximum particle size shall be less than the width between pipe ribs to ensure sufficient support can be provided.

**WPRC-W104.17 LOCATION**

The location, sizes, pipe class and other details of the sewers are shown on the Drawings. The location of maintenance structures are also shown on the Drawings. The pipelines and maintenance structures shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

**WPRC-W104.18 COVER OVER PIPES**

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 600 mm in non-trafficable locations.
- 750 mm in trafficable locations in private property (i.e. driveways).
- 900 mm under sealed roadways and footpaths.
- 1200 mm under major roadways.

**WPRC-W104.19 CROSSINGS**

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

**WPRC-W104.20 EXCAVATION**

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 14 of WSA02-2014. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000 mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate
shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRCE-W104.21 ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

**Definition of Rock**

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W104.22 BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 15 of WSA02-2014.

**WPRC-W104.23 LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 16 of WSA02-2014.

Before being laid, all pipeline system items shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting.
WPRC-W104.24  TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} \left( \% \right)}
\]

WPRC-W104.25  BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} \left( \% \right)} \text{ where } L = 80 \times \text{pipe length (m)} \left( 450m \text{ max} \right)
\]

Where \( L > 100m \) also construct intermediate trench stops at spacing < 100/grade (\%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} \left( \% \right)}
\]

WPRC-W104.26  PROPERTY CONNECTION SEWERS

Property connection sewers shall be constructions at the locations shown on the Drawings in accordance with WSA 02-2014 clause 16.7.

The termination of all property connection sewers shall be marked with non-detectable marking tape where an IO is not used.

WPRC-W104.27  MAINTENANCE STRUCTURES

Maintenance holes shall be constructed in accordance with WSA 02-2014 clause 17.

Maintenance chambers, shafts, inspection shafts and inspection openings shall be constructed in accordance with WSA 02-2014 clause 18.

Where specified on the Drawings, the Contractor shall coat the internal surface of maintenance holes with an approved epoxy.
WPRC-W104.28  CONCRETE ENCASEMENT

Concrete encasement shall be undertaken in accordance with WSA02-2014 clause 19.6.

Where pipes have less than 600mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

WPRC-W104.29  TRENCH FILL

Trench fill shall be undertaken in accordance with WSA04-2014 Clause 20.1.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause SW-102.20. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause SW-102.20. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300 mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600 mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300 mm.
WPRC-W104.30  BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA02-2014 Clause 16.12.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness.
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50 mm, then this shall be grouted with an approved grout mix.

WPRC-W104.31  COMPACTION TESTING

Compaction testing shall be carried out in accordance with WSA02-2014 Clause 21.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

WPRC-W104.32  AIR PRESSURE AND VACUUM TESTING OF SEWERS

All sewers shall be vacuum or air pressure tested in accordance with WSA02-2014 Clause 21.4. At no stage shall air pressure used exceed 50 kPa.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.
WPWR-CW104.33 VACUUM TESTING OF MAINTENANCE HOLES

Concrete maintenance holes shall be vacuum tested in accordance with WSA02-2014 Clause 21.4.5 based on the following frequency.

<table>
<thead>
<tr>
<th>Number of each type of MHs in the project</th>
<th>Cast in-situ concrete - minimum % tested initially</th>
<th>Pre-cast concrete - minimum % tested initially</th>
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<tr>
<td>Up to 5</td>
<td>20%</td>
<td>100%</td>
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<tr>
<td>6 to 10</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>11 to 20</td>
<td>20%</td>
<td>33%</td>
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<tr>
<td>More than 20</td>
<td>20%</td>
<td>25%</td>
</tr>
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</table>

WPWR-CW104.34 DEFLECTION (OVALITY) TESTING OF FLEXIBLE SEWERS

All flexible sewers shall be deflection (ovality) tested in accordance with WSA02-2014 Clause 21.6 at least 14 days after completion of placement and compaction of trench and embankment fill.

WPWR-CW104.35 CCTV INSPECTION

All sewers shall be inspected internally by CCTV in accordance with WSA02-2014 Clause 21.8 and WSA02-2014 Appendix L.

CCTV inspection footage and report shall be submitted to the Superintendent in Wincan format.

WPWR-CW104.36 CONNECTION TO EXISTING SEWERS

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Water Agency. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Water Agency, the Water Agency will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Water Agency will undertake the connection work. The Water Agency shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Water Agency may require longer notice in a case where the pipes are greater than DN150 mm in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 23 unless otherwise agreed with the Water Agency.
WPRC-W104.37 CONSTRUCTION TOLERANCES

All works shall be constructed within the tolerances as specified in WSA02-2014 clause 22.

WPRC-W104.38 WORK AS-EXECUTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.

WPRC-W104.39 RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA02-2014 Clause 24 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.
Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.
### APPENDIX A – AIR PRESSSURE/VACUUM TESTING FORMS

Part A - Notification of Sewer Air Pressure/Vacuum Testing by Contractor

**CONTRACTOR** ...................................................................................................................

**CONTRACT** ........................................................................................................................

**Proposed Hydrostatic Testing**

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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Contractor .................................................................................................................. (Signature)

............................................................................................................................... (Date)

Received by - Superintendent ..................................................................................... (Signature)

............................................................................................................................... (Date)

- Principal .................................................................................................................. (Signature)

............................................................................................................................... (Date)

CONTRACTOR ………………………………………………………..

CONTRACT …………………………………………………………

METHOD Low air pressure / vacuum (cross out whichever is not applicable)

Low Air Pressure / Vacuum Testing Results

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Length</th>
<th>Size (DN)</th>
<th>Start Time</th>
<th>Duration</th>
<th>Pass</th>
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Start pressure shall be 24 kPa and allowable loss over the duration of the test shall be 7 kPa.

Witnessed by Superintendent …....................................................................................... (Signature)

..................................................................................................................Date

Contractor .................................................................................................................. (Signature)

..................................................................................................................Date

CONTRACTOR ...........................................................................................................

CONTRACT ...........................................................................................................

Results of Maintenance Hole Testing – As per WSA02-2014 Clause Section 21.4.5

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<th>MH Depth</th>
<th>Minimum Test Time (s)</th>
<th>Start Vacuum Pressure</th>
<th>Start Time</th>
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Witnessed by Superintendent ........................................................................................................ (Signature)

.................................................................Date

Contractor ........................................................................................................ (Signature)

.................................................................Date
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W105

CONSTRUCTION OF GRAVITY TRUNK SEWERS
# TECHNICAL SCHEDULE WPRC-W105 – CONSTRUCTION OF GRAVITY TRUNK SEWERS

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</tr>
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<td>APPENDIX A – AIR PRESSURE/VACUUM TESTING FORMS</td>
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</tr>
</tbody>
</table>
**WPRC-W104: CONSTRUCTION OF GRAVITY TRUNK SEWERS**

**WPRC-W105.1 SCOPE**

This Specification applies to the construction of gravity trunk pipes (sewers) above DN300 mm and up to and including DN1200 mm, after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W105.2, unless specified otherwise herein.

**WPRC-W105.2 REFERENCED DOCUMENTS**

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

**Australian Standards**

AS 681  Elastomeric seals
AS 1260  PVC-U pipes and fittings for drain, waste and vent application
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741  Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2566  Buried flexible pipelines
AS 2758  Aggregates and rock for engineering purposes
AS 3571  Plastic piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) – pressure and non-pressure drainage and sewerage
AS 3879  Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996  Access covers and grates
AS 4058  Precast concrete pipes (pressure and non-pressure)
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4198  Precast concrete access chambers for sewerage applications
AS 5065  Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSA01</td>
<td>Polyethylene Pipeline Code</td>
</tr>
<tr>
<td>WSA02</td>
<td>Gravity Sewerage Code of Australia</td>
</tr>
<tr>
<td>N/A</td>
<td>WSAA Product Specifications</td>
</tr>
<tr>
<td>WSA 113</td>
<td>Industry Standard for Reinforced Concrete Pipes with Flexible Thermoplastic Linings</td>
</tr>
<tr>
<td>WSA 114</td>
<td>Concrete Special Class</td>
</tr>
<tr>
<td>WSA 137</td>
<td>Maintenance Shafts and Maintenance Chambers for Sewerage</td>
</tr>
</tbody>
</table>

**International Standards**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 295</td>
<td>Vitrified clay pipe systems for drains and sewers. Requirements for pipes, fittings and joints</td>
</tr>
<tr>
<td>ISO 10467</td>
<td>Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin</td>
</tr>
<tr>
<td>ATSM C990M-09</td>
<td>Standard specification for joints for concrete pipe, manholes and precast box sections using preformed flexible joint sealants (metric)</td>
</tr>
</tbody>
</table>

**WPRC-W105.3  STANDARDS**


**WPRC-W105.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 13.2 and 13.3 of WSA02-2014.

**WPRC-W105.5  GLASS REINFORCED PLASTIC (GRP) PIPE**

GRP pipes shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:
- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings.
Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

**WPRC-W105.6 VITRIFIED CLAY (VC) PIPE**

VC pipes for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:
- Manufactured in accordance with EN 295 or AS 1741
- Minimum crushing strength of 34 kN/m for DN150 mm
- Minimum class 120 for DN375 - 450 mm
- Minimum class 95 for DN500 mm and larger
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

**WPRC-W105.7 POLYPROPYLENE (PP) PIPE**

PP pipes shall be compliant with WSAA Product Specification WSA PS-240 and shall be:
- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

**WPRC-W105.8 POLYETHYLENE (PE) PIPE AND FITTINGS**

PE pipes shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:
- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.

**WPRC-W105.9 REINFORCED CONCRETE (RC) PLASTIC LINED PIPE**

RC pipes shall be compliant with WSAA Product Specification WSA PS-233 and WSAA Industry Standard WSA 113:2002 and shall be:
- Manufactured in accordance with AS 4058.
- Minimum pipe load class 4.
- Internally lined with factory cast-in thermoplastic liner.
- Externally coated with epoxy when installed in corrosive soils.
- Rubber ring jointed complying with AS 1646.
- Provided without lifting holes which are not permitted.
WPWR-W105.10 ACCESS COVERS

Access covers shall be compliant with WSAA Product Specification WSA PS-290 and shall be:

- Manufactured in accordance with AS 3996.
- Class D unless stated otherwise on the Drawings.
- Circular DN600 mm unless stated otherwise on the Drawings.
- Infilled with concrete (where required) in accordance with AS 3996. Concrete infill shall be a minimum of N32 and have a cement content of 400 kg/m³. Concrete infill shall be vibrated during installation to eliminate air pockets.
- Gas and water tight.
- Greased using approved sealing grease on all metal to metal seals after installation.
- Installed with vegetation rings where access covers are not located in a paved or sealed area.

WPWR-W105.11 STEP IRONS AND LADDERS

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

WPWR-W105.12 MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPWR-W105.13 CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.
WPRC-W105.14  TRENCH FILL MATERIAL

Trench fill in trafficable areas shall be 20 mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_D$) of not less than 95%.

WPRC-W105.15  EMBEDMENT MATERIAL

Embedment material shall be of the type and size as specified on the Drawings or as otherwise approved by the Superintendent.

- Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
- Embedment/5 mm minus fine crushed rock shall be compliance with WSAA Product Specification WSA PS-361.
- Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.
- Well graded crushed rock shall be compliant with WSAA Product Specification WSA PS-362 and shall be of the nominal size specified on the Drawings.
- Single size crushed rock shall be compliant with WSAA Product Specification WSA PS-351 and shall be of the nominal size specified on the Drawings.

Careful selection of embedment material size is required where ribbed pipes such as PP are used. Manufacturer’s recommendations should be sought and the maximum particle size shall be less than the width between pipe ribs to ensure sufficient support can be provided.

WPRC-W105.16  LOCATION

The location, sizes, pipe class and other details of the sewers are shown on the Drawings. The location of maintenance structures are also shown on the Drawings. The pipelines and maintenance structures shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.
WPRC-W105.17 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 600 mm in non-trafficable locations.
- 750 mm in trafficable locations in private property (ie driveways).
- 900 mm under sealed roadways and footpaths.
- 1200 mm under major roadways.

WPRC-W105.18 CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W105.19 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 14 of WSA02-2014. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000 mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.
WPRC-W105.20  ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

WPRC-W105.21  BEDDING FOR PIPES

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 15 of WSA02-2014.

WPRC-W105.22  LAYING OF PIPES

Laying of pipes shall be undertaken in accordance with Clause 16 of WSA02-2014.

Before being laid, all pipeline system items shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting.

WPRC-W105.23  TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (ie 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} \, (\%)}
\]
WPRC-W105.24  BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} (\%)} \text{ where } L = 80 \times \text{pipe length (m)} \text{ (450m max)}
\]

Where \( L > 100 \text{m} \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

WPRC-W105.25  MAINTENANCE HOLES

Maintenance holes shall be constructed in accordance with WSA 02-2014 clause 17.

Where specified on the Drawings, the Contractor shall coat the internal surface of maintenance holes with an approved epoxy.

WPRC-W105.26  TRENCH FILL

Trench fill shall be undertaken in accordance with WSA04-2014 Clause 20.1.

Trench fill in trafficable areas shall be 20 mm crushed rock as per Clause WPRC-W105.14. Trench fill material shall be placed and compacted in layers not exceeding 200 mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100 mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W105.14. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300 mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600 mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300 mm.
WPRL-W105.27 BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA02-2014 Clause 16.12.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) are not permitted within unsleeved boreholes. Trenchless installation of trunk sewers shall be undertaken using a specific jacking pipe or approved sleeve.

Where the annular void for the borehole exceeds 50 mm, then this shall be grouted with an approved grout mix.

WPRL-W105.28 COMPACTION TESTING

Compaction testing shall be carried out in accordance with WSA02-2014 Clause 21.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

WPRL-W105.29 AIR PRESSURE AND VACUUM TESTING OF SEWERS

All sewers shall be vacuum or air pressure tested in accordance with WSA02-2014 Clause 21.4. At no stage shall air pressure used exceed 50 kPa.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

WPRL-W105.30 VACUUM TESTING OF MAINTENANCE HOLES

Concrete maintenance holes shall be vacuum tested in accordance with WSA02-2014 Clause 21.4.5 based on the following frequency.

<table>
<thead>
<tr>
<th>Number of each type of MHs in the project</th>
<th>Cast in-situ concrete - minimum % tested initially</th>
<th>Pre-cast concrete - minimum % tested initially</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>6 to 10</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>11 to 20</td>
<td>20%</td>
<td>33%</td>
</tr>
<tr>
<td>More than 20</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>
WPRC-W105.31  DEFLECTION (OVALITY) TESTING OF FLEXIBLE SEWERS

All flexible sewers shall be deflection (ovality) tested in accordance with WSA02-2014 Clause 21.6 at least 14 days after completion of placement and compaction of trench and embankment fill.

Trunk sewers smaller than DN750 mm may be tested using either a proving tool or an approved electronic instrument. Deflection testing of sewers DN750 mm or larger shall only be undertaken using an approved electronic instrument.

WPRC-W105.32  CCTV INSPECTION

All sewers shall be inspected internally by CCTV in accordance with WSA02-2014 Clause 21.8 and WSA02-2014 Appendix L.

CCTV inspection footage and report shall be submitted to the Superintendent in Wincan format.

WPRC-W105.33  INSPECTION AND TESTING OF THERMOPLASTIC LINED RC SEWERS

Inspection and testing of thermoplastic lined RC sewers shall be undertaken in accordance with WSA02-2014 Clause 21.9. This shall include visual inspection and probing of all field welds with a feeler gauge followed by spark testing.

WPRC-W105.34  CONNECTION TO EXISTING SEWERS

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Water Agency. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Water Agency, the Water Agency will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Water Agency will undertake the connection work. The Water Agency shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Water Agency may require longer notice in a case where the pipes are greater than DN150 mm in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 23 unless otherwise agreed with the Water Agency.

WPRC-W105.35  CONSTRUCTION TOLERANCES

All works shall be constructed within the tolerances as specified in WSA02-2014 clause 22.
**WPSC-W105.36  WORK AS CONSTRUCTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked “As-Executed” with the relevant date and revision number. The Work As-Executed Drawings are required to show all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the ‘As Constructed’ Drawings and documentation.

**WPSC-W105.37  RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA02-2014 Clause 24 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.
APPENDIX A – AIR PRESSSURE/VACUUM TESTING FORMS

Part A - Notification of Sewer Air Pressure/Vacuum Testing by Contractor

CONTRACTOR .................................................................

CONTRACT .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td></td>
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</table>

Contractor ................................................................. (Signature)

................................................................. (Date)

Received by - Superintendent ................................................................. (Signature)

................................................................. (Date)

- Principal ................................................................. (Signature)

................................................................. (Date)

CONTRACTOR .................................................................

CONTRACT .................................................................

METHOD Low air pressure / vacuum (cross out whichever is not applicable)

Low Air Pressure / Vacuum Testing Results

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Length</th>
<th>Size (DN)</th>
<th>Start Time</th>
<th>Duration</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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</table>

Start pressure shall be 24 kPa and allowable loss over the duration of the test shall be 7 kPa.

Witnessed by Superintendent ........................................................................................................ (Signature)

.................................................................................................................................Date

Contractor .................................................................................................................................... (Signature)

.................................................................................................................................Date

CONTRACTOR .................................................................

CONTRACT .................................................................

Results of Maintenance Hole Testing – As per WSA02-2014 Clause Section 21.4.5

<table>
<thead>
<tr>
<th>MH No.</th>
<th>MH Diameter</th>
<th>MH Depth</th>
<th>Minimum Test Time (s)</th>
<th>Start Vacuum Pressure</th>
<th>Start Time</th>
<th>Duration</th>
<th>Pass</th>
</tr>
</thead>
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Witnessed by Superintendent .............................................................................................................. (Signature)

..................................................................................................................Date

Contractor ................................................................................................................................................. (Signature)

..................................................................................................................Date
TECHNICAL SCHEDULE

WPRC-W106

CONSTRUCTION OF SEWAGE PUMP STATIONS

WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former
Dubbo City & Wellington councils
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DCC-W106: CONSTRUCTION OF SEWAGE PUMP STATIONS

GENERAL

WPRC-W106.1 SCOPE

This Specification applies to the construction of Sewage Pump Stations up to and including 200L/s after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause DCC-W106.2, unless specified otherwise herein.

WPRC-W106.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 681 Elastomeric seals – material requirements for pipe joint seals used in water and drainage applications
AS 1100 Technical drawing
AS 1102 Graphical symbols for electrotechnical documentation
AS 1111 ISO metric hexagon commercial bolts and screws
AS 1112 ISO metric hexagon nuts
AS 1237 Plain washers for metric bolts, screws and nuts for general purposes
AS 1260 PVC-U pipes and fittings for drain, waste and vent application
AS 1289 Methods of testing soils for engineering purposes
AS 1379 Specification and supply of concrete
AS 1579 Arc-welded steel pipes and fittings for water and waste-water
AS 1627 Metal finishing
AS 1646 Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741 Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032 Code of Practice for installation of UPVC pipe systems
AS 2280 Ductile iron pressure pipe and fittings
AS 2566 Buried flexible pipelines
AS 2638 Cast iron sluice valves for waterworks purposes
AS 2758 Aggregates and rock for engineering purposes
AS 3571 Plastic piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) – pressure and non-pressure drainage and sewerage
AS 3600 Concrete structures
AS 3610 Formwork for concrete
AS 3680 Polythene Sleeving for Ductile Iron Pipes
AS 3681 Application of polyethylene for ductile iron piping
AS 3879 Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996 Access covers and grates
AS 4087 Metallic Flanges for Waterworks Purposes
AS 4130 Polyethylene (PE) pipes for pressure applications
AS 4198 Precast concrete access chambers for sewerage applications
AS 4158 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4321 Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
AS 4680 Hot dip galvanized (zinc) coatings on fabricated ferrous articles
AS 4671 Steel reinforcing materials
AS 4791 Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS 4792 Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
AS 4794 Non-return valves – swing check and tilting disc
AS 4956 Air valves for water supply
AS 5065 Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
AS 6401 Knife gate valves for waterworks purposes

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01 Polyethylene Pipeline Code
WSA02 Gravity Sewerage Code of Australia
WSA04 Sewage Pumping Station Code of Australia
N/A WSAA Product Specifications
WSA 101 Submersible pumps for sewerage pumping stations
WSA 113 Industry Standard for Reinforced Concrete Pipes with Flexible Thermoplastic Linings
WSA 114 Concrete Special Class
WSA 121 Biofilters for Odour Control
WSA 132 Access Covers for Water Supply and Sewerage
WSA 133 Lightweight Macro-Composite Access Covers and Frames
WSA 137 Maintenance Shafts and Maintenance Chambers for Sewerage
**International Standards**

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<td>Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin</td>
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**WPRC-W106.3 STANDARDS**

Construction of the Work Under Contract shall be undertaken in accordance with WSA04-2005 Sewage Pumping Station Code of Australia, Part 3: Construction.

**MATERIALS**

**WPRC-W106.4 DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 20.5 and 20.7 of WSA04-2005.

All pipe, fittings, pumpsets, mechanical equipment and other associated mechanical equipment shall be suitable for the contact with untreated sewage.

**WPRC-W106.5 PUMPSETS**

Pumpsets shall be of the type, model and have performance and meet the required duty as specified on the Drawings. Submersible pumpsets shall be compliant with WSAA Product Specification WSA PS-400 and WSAA Specification WSA 101.

Pumpsets shall be supplied with all pump stools, cabling, guiderails, supports and chains. All guiderails, supports and chains shall be stainless steel grade 316.
WPRC-W106.6  POLYVINYLCHLORIDE (PVC) PIPE – NON PRESSURE

PVC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-230 and shall be:

- Unplasticised PVC (PVC-U) pipes for non-pressure applications.
- Manufactured in accordance with AS 1260.
- Minimum stiffness class SN8 for DN150 mm and above.
- Minimum stiffness class SN10 for DN100 mm.
- Either rubber ring jointed complying with AS 1646 or solvent cement jointed complying with AS 3879.
- Installed in accordance with AS 2032.

WPRC-W106.7  VITRIFIED CLAY (VC) PIPE AND FITTINGS – NON PRESSURE

VC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:

- Manufactured in accordance with EN 295 or AS 1741.
- Minimum crushing strength of 34 kN/m for DN150 mm.
- Minimum class 160 for DN200 - 250 mm.
- Minimum class 120 for DN300 mm.
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

WPRC-W106.8  POLYPROPYLENE (PP) PIPE AND FITTINGS – NON PRESSURE

PP pipes and fittings shall be compliant with WSAA Product Specification WSA PS-240 and shall be:

- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

WPRC-W106.9  POLYETHYLENE (PE) PIPE AND FITTINGS – NON PRESSURE

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.
WPRC-W106.10 GLASS REINFORCED PLASTIC (GRP) PIPE – NON PRESSURE

GRP pipes shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:

- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings.

Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

WPRC-W106.11 DUCTILE IRON PIPE AND FITTINGS - PRESSURE

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200. Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212. Ductile iron epoxy lined (DIEL) pipes and fittings shall be:

- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Internally coated in accordance with AS 4158
- Externally coated with a bituminous or synthetic resin coating to AS 2280.

WPRC-W106.12 POLYETHYLENE (PE) PIPE AND FITTINGS - PRESSURE

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pressure class PN10.
- Coloured black with white stripes for sewage.
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

WPRC-W106.13 STAINLESS STEEL PIPEWORK – PRESSURE

Stainless steel (SS) pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 as applicable and shall be:

- Grade 316 unless noted otherwise on the drawings.
- Fabricated in the factory. In general site welding will not be permitted. Restricted site welding may be allowed at the discretion of the Superintendent.
- A minimum pipe wall thickness as per Schedule 10 of ANSI/ASME B36.10 Welded and Seamless Wrought Steel Pipe.
WPRC-W106.14  MILD STEEL PIPES AND FITTINGS - PRESSURE

Mild Steel Epoxy Lined (MSEL) pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:

- Manufactured in accordance with AS 1579.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Internally coated in accordance with AS 4158
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller.
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

WPRC-W106.15  STOP VALVES

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
- Provided with a handwheel where installed within a pit or above ground.

WPRC-W106.16  KNIFE GATE VALVES

Knife gate valves shall be in compliance with WSAA Product Specification WSA PS-266 and shall be:

- Manufactured in accordance with AS 6401.
- Stainless steel grade 316.
- Lugged type.
- Minimum pressure rating PN10.
- Clockwise closing.
- Non rising stem.

WPRC-W106.17  AIR VALVES

Air valves shall be in compliance with WSAA Product Specification WSA PS-275 and shall be:

- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with sewage.
- Installed with an isolation valve.
- Minimum diameter DN80mm.
WPRC-W106.18  NON-RETURN VALVES

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:

- Manufactured in accordance with AS 4794.
- Minimum pressure class PN10.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.

WPRC-W106.19  MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W106.20  FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W106.21  FASTENERS

All bolts, nuts and washers shall be stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W106.22  GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

WPRC-W106.23  METALWORK

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable where not in contact with sewage. Where located in contact with sewage metalwork shall be stainless steel grade 316.

WPRC-W106.24  ACCESS COVERS

Ductile Iron access covers and frames where specified shall be compliant with WSAA Product Specification WSA PS-290 and WSAA Specification WSA 132. These shall be manufactured in accordance with AS 3996 and shall be greased using an approved sealing grease on all metal to metal seals after installation.

Macro-composite access covers and frames where specified shall be compliant to WSAA Product Specification WSA PS-292 and WSA 133.
Aluminium access covers where specified shall be in accordance with the details provided on the Drawings. Aluminium covers shall have sufficient strength and stiffness for pedestrian loading (not traffic) and shall be protected from incurring traffic loading. Aluminium covers shall be lockable and designed to be safely opened by one person.

All access covers shall be gas and water tight and shall be of the size and class as specified on the Drawings. Unless noted otherwise, all access covers shall have stainless steel or FRP safety grate underneath for fall protection.

**WPRC-W106.25  STEP IRONS AND LADDERS**

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

**WPRC-W106.26  MAINTENANCE HOLES**

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

**WPRC-W106.27  CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

Reinforcement shall be compliance with AS 4671.
WPRC-W106.28  TRENCH FILL MATERIAL

Trench fill in trafficable areas shall be 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio \( R_0 \) of not less than 95%.

WPRC-W106.29  EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W106.30  MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W106.31  EPOXY COATING

Epoxy coating shall be of the type and installed at the locations specified on the Drawings and or/Project Specification. Epoxy costing shall be installed in accordance with the manufacturers recommendations and requirements including preparation of concrete surfaces and application of all necessary primers/undercoats and coatings.
CONSTRUCTION OF SEWAGE PUMP STATIONS

EARTHWORKS

WPRC-W106.32 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 28 of WSA04-2005.

For trenches, minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1,000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

Where the bottom of an excavation is soft or considered to provide an unacceptable foundation, the Contractor shall seek instruction from the Superintendent and then undertake foundation stabilisation in accordance with Clause 28.8 of WSA04-2005.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with Technical Schedule SW-101 General Construction.

WPRC-W106.33 ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor’s expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material that can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.
Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W106.34 BACKFILL**

Backfilling shall be undertaken in accordance with WSA04-2005 Clause 33.

Backfill shall be placed and compacted in even layers on either side of structures to avoid differential loading. Backfill containing boulders, large rocks, logs, stumps, tree loppings, builders refuse, broken concrete and other like material is expressly forbidden.

All dewatering systems shall be kept operating during backfilling so that no fill material is placed or compacted under water. At all times ensure that the pipelines and structures are not damaged or moved during placement and compaction of fill.

Unless specified otherwise, backfill material/trench fill in trafficable areas 20mm crushed rock as per Clause DCC-W106.28. Fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Unless specified otherwise, backfill material/trench fill in non-trafficable areas may be select excavated or imported material complying with Clause DCC-W106.28. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1 relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

**CONCRETE WORKS**

**WPRC-W106.35 BEDDING FOR STRUCTURES AND PIPES**

Bedding for structures and pipes shall be provided in accordance with Clause 29 of WSA04-2005 where required.
WPRC-W106.36  WET-WELLS

Wet-wells shall be constructed in accordance with WSA 04-2005 clause 31.

The Contractor shall coat the internal surface of the wet-well with an approved epoxy, unless specified otherwise on the Drawings.

WPRC-W106.37  MAINTENANCE HOLES

Maintenance holes shall be constructed in accordance with WSA 04-2005 clause 31.

The Contractor shall coat the internal surface of the rising main discharge maintenance hole and any other maintenance holes specified on the Drawings, with an approved epoxy.

WPRC-W106.38  CONCRETE - GENERAL

Concrete works including delivery, formwork, reinforcement and placement shall be undertaken in accordance with Clause 20.10 of WSA04-2005.

WPRC-W106.39  CONCRETE DELIVERY

The concrete for every part of the WUC shall be supplied as ready-mixed concrete supplied in accordance with AS 1379, except where modified by the Project Specification or Drawings. Delivery of ready-mixed concrete in non-agitating trucks will not be permitted.

Each truck of ready-mixed concrete shall be accompanied by a docket bearing the following information:

- The specific part of the WUC for which the concrete was ordered and is intended.
- The quantity of concrete contained.
- The time of dispatch.
- The type of concrete supplied, including details of:
  - Type of cement
  - Slump
  - Maximum aggregate size
  - Concrete characteristic strength f’c
  - Admixtures used

The Contractor shall retain these dockets as a record of the ready-mixed concrete delivered, and this information shall be provided to the Superintendent on request.

Under no circumstances will hand mixed concrete be permitted.

Concrete shall not be placed when the site ambient temperature exceeds 30°C or is forecast to exceed 30°C during the day the concrete is to be placed. Under no circumstances shall the concrete be supplied at a temperature less than 5°C.
CONSTRUCTION OF SEWAGE PUMP STATIONS

WPRC-W106.40  CONCRETE PLACEMENT

Placement of concrete in each section shall be in one continuous operation or until an authorised construction joint is reached. Concrete shall not be dropped freely from a height exceeding 1,200mm except where obstructions prevent and in such cases pour to the approval of the Superintendent and in such a way as to prevent segregation and to ensure an unbroken stream of concrete.

Concrete shall be placed between construction joints as shown on the design drawings. Maximum pour lengths shall be 14m for base and wall pours.

Preparation of concreting shall be such that all operations can be carried out without damaging or displacing reinforcement or formwork. Ensure surfaces against which concrete is to be placed are clean, moist (if absorbent), free from laitance and other coatings and free of weak or loose material. In hot weather, cool non-absorbent surfaces by watering and remove excess.

Concrete shall be placed in maximum 300mm layers such that each succeeding layer is blended into the preceding one by the compaction process. No layer shall be tapered off but shall be stopped against tight forms to produce square ends and shall be so moulded by inset formwork that the construction joint will finish approximately square to all exterior surfaces.

WPRC-W106.41  CONCRETE COMPACTION

The Contractor shall use immersion and screed vibrators accompanied by hand methods as appropriate and form vibrators where use of immersed vibrators is impracticable. Concrete shall be fully compacted and entrapped air removed. Vibrators shall not be permitted to come into contact with partially hardened concrete, or reinforcement embedded in it. Vibrators shall not be used to move concrete along the forms. Insert at points maximum 500 mm apart. The Contractor shall provide the Superintendent with details of proposed methods of compaction.

The total compacting capacity in cubic metres of concrete per hour of all vibrators in effective operating condition and employed in concrete compaction works, shall be based on a rated capacity of 80% of the manufacturer's recommendation for each type of vibrator in operation, and the total compacting capacity so computed shall be not less than the maximum rate at which concrete is placed. Vibrators shall be capable of transmitting vibrations to the concrete at frequencies between 6,000 and 12,000 impulses per minute and shall visibly affect the concrete at a radius of 300mm. Hold in reserve at least one vibrator in working order with one extra for each four vibrators in use. Avoid over-vibration. Do not allow vibrators to remain in any one position for more than 20 seconds.

WPRC-W106.42  CONCRETE TESTING

The Contractor shall arrange for concrete sampling and testing, including transportation of cylinders. For concrete supply of over 1m³, a minimum of 2 cylinders shall be taken. A Slump Test shall also be carried out at the time that the cylinders are taken.

Sampling and testing shall be in accordance with relevant Australian Standards, using NATA certified tests. The cost for all these works shall be borne by the Contractor.
WPRC-W106.43  CONCRETE FINISHING

The Contractor shall ensure that tolerance requirements for formwork are in accordance with the specification.

All formwork shall be designed, constructed and stripped in accordance with AS 3610.

All formed surfaces, except where permanently concealed by backfill material, shall have a minimum surface finish of Class 2 in accordance with AS 3610.

All formed finishes that are permanently concealed by backfill material, shall have a minimum surface finish of Class 3 in accordance with AS 3610.

All unformed surfaces shall comply with AS 3600. All unformed surfaces except roofs and footpaths shall have steel trowel or power float finish generally free of trowel marks. The finished concrete surfaces shall be true to the planes with tolerances not exceeding 6mm in 3m and abrupt not exceeding 2mm anywhere on the surface. All other surfaces shall be wood float finished to the same tolerances as above. All edges and re-entrant corners shall be provided with 20mm chamfers or fillets.

WPRC-W106.44  CONCRETE CURING

Freshly cast concrete shall be protected from premature drying and excessively hot or cold temperatures. In windy conditions windbreaks shall be erected to shield the concrete surfaces during and after placement. The concrete shall be maintained at a reasonable constant temperature with minimum moisture loss for the curing period. The curing method shall be as specified in the Project Specification or as otherwise approved by the Superintendent.

WPRC-W106.45  COREHOLES, EMBEDDED SERVICES AND FIXINGS

The provision of coreholes and embedments shall be in accordance with the requirements of Section 14 of AS 3600, except as specified otherwise.

The Contractor shall verify location and sizes shown on concrete drawings and submit details of departures to the Superintendent. The Contractor shall provide sufficient notice to the Superintendent (not less than 24 hours) to enable inspection of the holes and fixings.

Holes for services and other purposes shall be blocked out and sleeves, bolts and other attachments required securely fixed in position before concrete is placed.

All inserts, anchor bolts and embedded fixings shall be grade 316 stainless steel unless otherwise indicated on the Drawings. No embedded pipe or fixing shall be aluminium. Set holding down bolts accurately to the positions and levels shown on the Drawings or required by the components to be installed and rigidly held in position by attachment to suitable templates while concrete is being poured. Reinforcement shall not be cut to provide space for embedded items or displace it without approval.
Where pipes are to pass through concrete and in the opinion of the Superintendent watertightness or load bearing capacity is not of prime importance the Contractor shall leave a hole in the wall large enough to allow the pipe fitting flange to pass through but not more than 50mm larger than the flange. After the pipe fitting has been aligned correctly to match its connecting pipework the Contractor shall caulk the space around the pipe with dry pack mortar or S40 concrete and finish by stoning or otherwise to match the adjoining concrete.

Where pipes or other fittings are to pass through water retaining concrete or in the opinion of the Superintendent require to be securely fixed because of structural loading the Contractor shall fix the pipes or fittings through the formwork and cast them into the structure when placing the concrete. All paint and loose surface material shall be removed from such pipes and fittings over the surface to be embedded by wire brushing or other approved means. Unless otherwise specified or shown on the Drawings tolerances shall be ±10mm.

Cutting or drilling holes in concrete and the attachment or insertion of fittings after the concrete has set unless required by the Specification or Drawings shall only be carried out with the approval of the Superintendent.

Drilled anchor type fixings and fixings by explosive tools shall only be used if approved by the Superintendent.

**WPRC-W106.46 CONSTRUCTION JOINTS**

Construction joints shall be to AS3600, Clause 19.4.1 and provided at the locations as specified or as shown on the Drawings.

Before fresh concrete is placed against hardened concrete at construction joints, the joint surface of the hardened concrete shall be thoroughly roughened by mechanical or wet cut means and cleaned so that all loose or soft material, all foreign matter, and all laitance are removed. Immediately ahead of concrete placement, the joint surfaces shall be dampened and shall not be allowed to dry out before placing the fresh concrete.

If the desired locations of construction joints are not specified or shown on the Drawings, the Contractor shall submit to the Superintendent at least one week before commencing the placement of concrete in a section of the WUC the proposed locations of construction joints.

In general construction joints shall be perpendicular to the main reinforcement. Construction joints in cantilever slabs are not permitted. All construction joints in new concrete shall be formed either on horizontal or vertical planes unless otherwise shown on the Drawings.

Before fresh concrete is placed at a construction joint, roughen and clean the hardened concrete surface of the joint, so that all loose or soft material, foreign matter and laitance is removed to expose clean coarse aggregate. Just prior to placement, dampen the hardened concrete surface, without leaving free water.

Unless otherwise specified, butt join the surfaces of adjoining pours. Surfaces/edges that remain visible, to AS 3610, physical quality requirements, Class 2.
In order to minimise shrinkage effects of the concrete, the Drawings and this Technical Schedule require certain minimum periods to elapse between adjacent pours of concrete at joints. These periods shall not be varied without the approval of the Superintendent. Where time periods between pours are not indicated in the contract documents the Contractor shall submit their requirements in this regard to the Superintendent for examination and approval.

The time delay between concrete pours abutting vertical construction joints in walls shall not be less than 3 days. The time delay between concrete pours abutting horizontal construction joints in walls shall not be less than 3 days. The time delay between "pour strip" concrete and adjoining concrete shall not be less than forty five (45) days.

**PIPEWORK**

**WPRC-W106.47 GRAVITY SEWERS**

The construction of gravity sewers shall be undertaken in accordance with either of the following Technical Schedules as relevant to the WUC:

- SW-104 Construction of Gravity Reticulation Sewers
- SW-105 Construction of Gravity Trunk Sewers

**WPRC-W106.48 SEWAGE RISING MAINS**

The construction of sewage rising mains and pressure pipework shall be undertaken in accordance with Technical Schedule DCC-W107 Construction of Sewage Rising Mains.

**WPRC-W106.49 POTABLE WATER**

The construction of potable water works for the Sewage Pump Station shall be undertaken in accordance with Technical Schedule SW-102 Construction of Water Reticulation and AS 3500 as applicable.

**WPRC-W106.50 MISCELLANEOUS PIPEWORK**

Miscellaneous pipework such as vent pipework and conduits shall be constructed as detailed on the Drawings and in accordance with the relevant Standards.

Unless specified otherwise on the Drawings or relevant standards, the minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.
METALWORK

WPWRC-W106.51 METALWORK GENERAL

Metalwork shall be undertaken in accordance with the relevant Australian Standards and Clause 25 of WSA04-2005.

The Contractor shall use metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Incompatible metals shall be separated using concealed layers of suitable materials in appropriate thicknesses. Fasteners shall be used so that they transmit the loads and without causing galvanic corrosion.

For copper and copper alloys only copper or copper-alloy fixing devices shall be used. For aluminium and aluminium alloys only aluminium alloy or non-magnetic stainless steel fixing devices shall be used. For stainless steel only appropriate stainless steel materials shall be used.

The Contractor shall fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces shall be kept clean, neat and free from burrs and indentations. Sharp edges shall be removed without excessive radiusing. Joints shall accurately fitted to a fine hairline. Bends shall be formed in tube without visibly deforming the cross section.

For colour finished work, colours of sheets, extrusions and heads of fasteners shall be matched.

Thermal movement shall be accommodated for in joints and fastenings.

SITE WORK

WPWRC-W106.52 ACCESS ROADS AND HARDSTAND AREAS

Access roads and hardstand areas shall be constructed in accordance with the Drawings and Clause 26 of WSA04-2005 along with any other applicable Standards.

WPWRC-W106.53 RETAINING WALLS

Where retaining walls are required, these shall be constructed in accordance with the Drawings and Clause 27 of WSA04-2005 for timber cantilever and concrete crib wall type retaining walls.

WPWRC-W106.54 FENCING

Where specified, site fencing shall be provided in accordance with the Drawings.
WPRC-W106.55  RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA04-2005 Clause 35 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the WUC would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the WUC to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

MECHANICAL INSTALLATION

WPRC-W106.56  GENERAL

Mechanical installation of pumps, valves and fittings shall be undertaken in accordance with the Drawings, Project Specification and Clause 24 of WSA04-2005.

ELECTRICAL AND TELEMETRY WORKS

WPRC-W106.57  SCOPE

The scope of the electrical and telemetry works shall be as detailed throughout the project documentation including Drawings and Specification. Unless specified otherwise, this shall include the furnishing of all labour, materials, equipment and services for the design, documentation, manufacture, supply, installation, programming, configuration, testing, commissioning and hand-over of the complete and operable electrical, control, instrumentation, PLC, telemetry and SCADA systems.
WPRC-W106.58 ELECTRICAL GENERAL

The Contractor shall carry out the Electrical Works in accordance with the requirements of:
- Project Specification and Drawings (where applicable).
- Clause 21 of WSA04-2005.
- Wiring Rules AS/NZS 3000.
- Service Rules of the Supply Authority.
- All relevant Statutory Authorities.
- The Principal.

WPRC-W106.59 TELEMETRY GENERAL

The Contractor shall carry out the Telemetry Works in accordance with the requirements of:
- Project Specification and Drawings (where applicable).
- Clause 22 of WSA04-2005.
- Wiring Rules AS/NZS 3000.
- Service Rules of the Supply Authority.
- All relevant Statutory Authorities.
- The Principal.

WPRC-W106.60 SCADA SYSTEMS

The WUC shall be integrated into the Principal’s existing SCADA systems by the Contractor to provide supervisory control and monitoring of the new works as specified, in accordance with the Principal’s SCADA standards and to provide the overall plant performance functionality specified.

The SCADA systems shall be arranged for remote operation from the Principal’s remote SCADA workstations.

The Contractor shall engage one of the Principal’s approved SCADA Contractors to undertake the configuration and programming of the SCADA systems.

Upgrading of the Principal’s SCADA package licence shall by undertaken separately by the Principal unless specified otherwise. The Contractor shall submit draft display layouts for approval prior to commencement of programming and configuration of the displays.

It shall be possible for operators to inhibit some of the specified alarms if required.

SCADA trending of all analogue inputs shall be provided.

All flow signals shall be totalised and monthly and yearly totals recorded on SCADA.
Drawings and Data

Drawings and data to be submitted by the Contractor, and its sub-contractors, shall include the following:

- Certified Design Drawings and information.
- Manufacturing Drawings.
- Emergency generator drawings and data (where applicable).
- Detailed 'As-Executed' Drawings and Documents.

All drawings shall be prepared generally in accordance with the recommendations of AS 1100 or AS 1102 as appropriate. Unless otherwise specified, symbols and abbreviations shown on drawings supplied by the Contractor shall be:

- As shown on the Contract Drawings supplied by the Principal.
- In accordance with the referenced standards.

All drawings submitted by the Contractor shall be prepared using AutoCAD release 2013 and electronic copies shall be provided in PDF and DWG format.

The format, content and layout of the drawings shall be similar and at least equivalent to those included in the Contract documents. The Contractor's drawing sheets shall be of similar layout to the Principal's Drawing sheets and shall use drawing numbers allocated by the Principal.

Within 7 days of the Letter of Acceptance, the Contractor shall prepare and submit a schedule of drawings it intends to prepare for the whole of the WUC.

Acceptance by the Superintendent of any drawings or descriptive materials shall not relieve the Contractor of his responsibility for any errors therein or his responsibility to complete the WUC in accordance with the Contract. Such acceptance shall be considered to mean only that the Superintendent has no objection to the Contractor using, upon his own full responsibility, the plan or method of work proposed, or furnishing the materials and equipment proposed.

Certified Design Drawings and Certified Design Information

The Contractor shall submit design drawings and information certified to an acceptable standard as being an accurate description of the plant or equipment supplied under the Contract.
The Contractor shall submit the following documentation prior to the Contractor commencing any related work associated with procurement, construction or manufacture:

- Detailed single line diagrams of all power supply systems.
- Circuit diagrams of each item of equipment and system supplied under the Contract. These shall include updating of the Contract Drawings with additional details including: addition of model/part numbers, terminal numbers, wire numbers and the like.
- PLC drawings including input/output circuit diagrams and rack layout drawings.
- PLC interface circuit drawings.
- Instrumentation loop drawings.
- Alarm listings.
- Functional specification and data table layout of PLC systems.
- Detailed arrangement drawings of the cubicle/cabinets and panels showing general arrangement, major dimensions, masses, locations of terminal boxes, and all service connections.
- Shop drawings for the switchgear including material lists, general arrangements, front views, assembly drawings, foundation plans, circuit diagrams and wiring and connection diagrams. Overall dimensions, minimum clearances and door swings shall be shown for all equipment.
- Detailed listing and catalogue information and technical data for all electrical equipment, items and devices to be provided by the Contractor.
- Arrangement of floor and foundation openings and other foundation details required for panels and cubicles/cabinets.
- Detailed arrangement drawings of all other items of equipment supplied by the Contractor under the Contract.
- A Schedule of Labels for equipment and devices.
- Proposed testing and commissioning procedure, and list of specified test equipment.

Manufacturing Drawings

During the Contract, the Contractor shall submit drawings of the various items of equipment to be supplied by the Contractor. These drawings shall include those used for manufacturer, such as all design and shop drawings.

Contractor shall submit for approval, shop drawings of the switchgear, control cubicle/cabinets and panels showing:
- The general arrangement including detailed layout of all equipment and connections.
- Structural and enclosing elements including sheet metal and sealing details.
- Type and rating of equipment items.
- Terminal block layouts and identification.

Work As-Executed Drawings and PLC and SCADA Programs

The Contractor shall maintain an up-to-date 'Work As-Executed' record of the WUC during manufacture and installation and comply with section SW-106.70. Copies of the marked up drawings and programs shall be provided in the switchboard and control panel at each site at all times.

Details included on Work As-Executed Drawings shall include the addition of model/part numbers, terminal numbers, wire numbers and the like.
Work As-Executed Drawings PLC and SCADA programs shall be provided to Principal in the formats (including electronic format) previously specified and shall include all drawings and documentation prepared as part of this Contract.

The latest revision of the as installed PLC program shall be provided as both a paper copy and a full listing (with descriptors) as an electronic copy. These shall include the complete program and documentation listings with address and rung comments and symbols.

**ACCEPTANCE TESTING AND COMMISSIONING**

**WPRC-W106.62  COMPACCTION TESTING**

Compaction testing shall be carried out in accordance with WSA04-2005 Clause 36.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W106.63  PRESSURE PIPEWORK TESTING**

All pressure pipelines greater than 20m in length shall be hydrostatically pressure tested in accordance with Technical Schedule SW-102 Construction of Water Reticulation.

**WPRC-W106.64  GRAVITY SEWER AND MAINTENANCE HOLE TESTING**

All gravity sewers and maintenance holes shall be air pressure and/or vacuum tested, deflection tested (flexible pipes) and CCTV inspected in accordance with Technical Schedule SW-105 Construction of Gravity Reticulation Sewers or SW-105 Construction of Gravity Trunk Sewers as applicable.

**WPRC-W106.65  WET-WELL AND EMERGENCY STORAGE TANK TESTING**

The Contractor shall hydrostatically test the concrete SPS wet-well and emergency storage tank prior to application of coatings. Prior to testing of the concrete water retaining structure all stop gates required for that structure shall be installed. All pipework penetrations shall be in place and may be blanked off if the pipeline is not completed.
Tests shall be undertaken in accordance with AS 3735 and is not limited to the following components:

- Fill the structure to the level directed by the Superintendent, which shall be no less than the design top water level shown on the drawings;
- Check any valves/penstocks for leakage. If any leakage is noticeable, the Contractor may either undertake repair works to seal the penstock or temporarily seal the area with sand bags or the like to allow testing of the water retaining structure to continue and repair the leak following the test;
- Once the structure is full, allow the water to sit in the concrete for a period of 7 days to allow for any water take-up;
- Fix a cylindrical bucket in the tank to be tested by suspending the bucket in the structure. Fill the bucket approximately 3/4 full and set the bucket such that the water level in the bucket is slightly higher than in the structure. Fix a ruler to the inside of the bucket and record the water level in the bucket at 24 hour intervals for 7 days; and,
- At the end of the 7 day test period, provide the results to the Superintendent for approval.

The Contractor shall rectify the WUC if the leakage is either visually evident or greater than the rate described in AS 3735.

**WPRC-W106.66  ELECTRICAL WORKS ACCEPTANCE TESTING**

Electrical and control works shall be tested and commissioned in accordance with any Project Specification and WSA 04-2005 Section 36.9.

**WPRC-W106.67  ODOUR CONTROL SYSTEM TESTING**

Following commissioning of the SPS, the odour control system shall be tested in accordance with WSA 04-2005 Section 37.3.

**WPRC-W106.68  CONNECTION TO EXISTING SEWERS**

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working day’s notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in case where the pipes are greater than DN150 in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 34 unless otherwise agreed with the Water Agency.
WPRC-W106.69 OPERATIONS AND MAINTENANCE MANUAL

The Contractor shall submit an Operation and Maintenance (O&M) Manual and shall contain instructions for handling, installation, operation, and maintenance of the WUC.

The spine and front cover of each O&M manual shall be printed and contain the Contract Number, Contract Name and type of equipment. The O&M manual shall contain identification of the supplier’s name, and, as applicable, names, addresses and phone numbers of sub-suppliers, nearest material, equipment and parts suppliers, and service organisations.

Not less than 3 weeks prior to final Commissioning, the Contractor shall supply comprehensive instruction manuals suitable for the detailed training and guidance of personnel in the installation, operation and maintenance of the equipment supplied under this Contract.

Two bound copies of each manual shall be submitted for approval and three bound final copies shall be provided.

All manuals shall be in the English language and shall be specific to the equipment being provided. The Manuals shall include, but not be limited to:

- Literature, data sheets, etc. required for operation and maintenance of the equipment.
- Data shall be functionally complete for all equipment and systems;
- Data shall include drawings, diagrams (including wiring diagrams), pictures, or actual photographs (when they add to the understanding and clarity of the text), as necessary to describe the equipment provided;
- Precautions and warnings relative to personal safety and the protection of the equipment shall be included where applicable;
- Detailed manual for each item of equipment provided under the Contract.
- Detailed manual for each type of PLC module and instrument.
- Recordings of the settings and configuration of all electronic devices - such as soft starters and instruments.
- Commercial information (brochures, catalogues, etc.) for many items of equipment shall be utilized under the following conditions;
- Operating and maintenance instructions.

WPRC-W106.70 WORK AS-EXECUTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

The location of all underground services, cables and conduits shall be accurately recorded on the approved for construction drawings during the course of the WUC.
Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As-Executed' Drawings and documentation.

**WPRC-W106.71 COMMISSIONING**

Commissioning of the WUC shall be carried out in accordance with WSA04-2005 Clause 21, any Project Specification and any instruction from the Superintendent.

The Contractor shall test and/or inspect all materials, equipment, installation and workmanship included in the WUC to prove compliance with the Specification requirements. Testing shall include pre-commissioning, field testing and performance testing of each part of the whole installation.

Tests and inspections shall comply with current relevant Australian Standards and WSA04-2005.

The Contractor shall prepare a Commissioning Plan and program and submit this to the Superintendent for approval at least 4 weeks prior to the commencement of commissioning.

Pre-commissioning is the preparation of plant or equipment so that it is in a safe and proper condition and ready for commissioning and operation. It includes all aspects of plant operation such as safety, electrical, mechanical and instrumentation.

Commissioning is the running of the plant and equipment to ensure flow through the pumping system, carrying out any necessary testing and adjustments until it is ready and suitable for normal starting and running under service conditions.

Handover is when the system is accepted by the Water Agency as fit-for-purpose and subsequently put into operation by the Water Agency. It is also when all documentation is completed and supplied to the Water Agency by the contractor, and when all system defects are closed out.

The Contractor shall prepare and use pre-commissioning and commissioning record sheets and or checklists. At the completion of each phase, these shall be signed by both the Contractor and Superintendent or nominated representative who witnessed the test/s and then be submitted to the Superintendent.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W107

CONSTRUCTION OF SEWAGE RISING MAINS
## TECHNICAL SCHEDULE WPRC-W107 – CONSTRUCTION OF SEWAGE RISING MAINS

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APPENDIX A – HYDROSTATIC TESTING FORMS | 18
WPRC-W107: CONSTRUCTION OF SEWAGE RISING MAINS

GENERAL

WPRC-W107.1 SCOPE

This Specification applies to the construction of sewage rising mains up to and including DN 375mm after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W107.2, unless specified otherwise herein.

WPRC-W107.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1111  ISO metric hexagon commercial bolts and screws
AS 1112  ISO metric hexagon nuts
AS 1214  Hot dipped galvanised coating on threaded fasteners
AS 1237  Plain washers for metric bolts, screws and nuts for general purposes
AS 1281  Cement mortar lining of steel pipe and fittings
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1477  PVC Pipes and fittings for pressure applications
AS 1579  Arc-welded steel pipes and fittings for water and waste-water
AS 1627  Metal finishing
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2280  Ductile iron pressure pipe and fittings
AS 2566  Buried flexible pipelines
AS 2638  Cast iron sluice valves for waterworks purposes
AS 3571  Plastic piping systems — Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) — pressure and non-pressure drainage and sewerage
AS 3680  Polythene Sleeving for Ductile Iron Pipes
AS 3681  Application of polyethylene for ductile iron piping
Testing of products for use in contact with drinking water

Metallic Flanges for Waterworks Purposes

Polyethylene (PE) pipes for pressure applications

Thermal-bonded polymeric coatings on valves and fittings for water industry purposes

Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings

Oriented PVC (PVC-O) pipes for pressure applications

Hot dip galvanised (zinc) coatings on fabricated ferrous articles

Modified PVC (PVC-M) pipes for pressure applications

Hot-dip galvanised (zinc) coatings on ferrous open sections, applied by an in-line process

Hot-dip galvanised (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process

Non-return valves – swing check and tilting disc

Air valves for water supply

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

Polyethylene Pipeline Code

Sewage Pumping Station Code of Australia

WSAA Product Specifications

Concrete Special Class

Access Covers for Water Supply and Sewerage

International Standards

Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin

Construction of the Work Under Contract (WUC) shall be undertaken in accordance with WSA04-2005 Sewage Pumping Station Code of Australia, Part 3: Construction.
WPRC-W107.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 20.5 and 20.7 of WSA04-2005.

All pipe, fittings and associated mechanical equipment shall be suitable for the contact with untreated sewage.

WPRC-W107.5  POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be either:
- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.

All PVC pipe shall be:
- Minimum pressure class PN16.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured white or light grey for sewage.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Legibly and durably marked with black letters of at least 10 mm high “SEWAGE – DO NOT DRINK” or equivalent, repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

WPRC-W107.6  DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200. Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Where Ductile Iron Cement Lined (DICL) is specified on the Drawings, pipes shall be cement lined in accordance with AS 1281 (DICL) with sulphate resisting cement and seal coated. Where Ductile Iron Epoxy Lined (DIEL) is specified on the Drawings, pipes shall be internally coated in accordance with AS 4158.

Ductile iron pipes and fittings shall be:
- Manufactured in accordance with AS 2280.
Minimum pressure class PN35 (alternatively flange class may be used).
Rubber ring or flanged jointed.
Externally coated with a bituminous or synthetic resin coating to AS 2280.

**WPRC-W107.7 POLYETHYLENE (PE) PIPE AND FITTINGS**

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:
- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN10.
- Coloured black with white stripes for sewage.
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

**WPRC-W107.8 GLASS REINFORCED PLASTIC (GRP) PIPES AND FITTINGS**

GRP pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:
- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum pressure class PN10.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings or flange jointed.
- Installed with detectable marker tape to assist with future pipe location.

Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

**WPRC-W107.9 MILD STEEL PIPES AND FITTINGS**

MSCL pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:
- Manufactured in accordance with AS 1579.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

Where Mild Steel Cement Lined (MSCL) is specified on the Drawings, pipes shall be cement lined in accordance with AS 1281 with sulphate resisting cement and seal coated. Where Mild Steel Epoxy Lined (MSEL) is specified on the Drawings, pipes shall be internally coated in accordance with AS 4158.
WPRC-W107.10 STOP VALVES

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
- Provided with a handwheel where installed within a pit or above ground.

WPRC-W107.11 AIR VALVES

Air valves shall be compliant with WSAA Product Specification WSA PS-275 and shall be:

- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with sewage.
- Installed with an isolation valve.
- Minimum diameter DN80mm.

WPRC-W107.12 MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W107.13 FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W107.14 FASTENERS

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W107.15 GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted.
to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

**WPRC-W107.16 METALWORK**

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable where not in contact with sewage. Where located in contact with sewage metalwork shall be stainless steel grade 316.

**WPRC-W107.17 CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

**WPRC-W107.18 TRENCH FILL MATERIAL**

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio (Rd) of not less than 95%.

**WPRC-W107.19 EMBEDMENT MATERIAL**

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
WPRC-W107.20 MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W107.21 LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves, scours and air valves are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W107.22 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.

The maximum cover for sewage rising mains shall be 1500mm unless otherwise approved by the Superintendent.

WPRC-W107.23 CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor's responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W107.24 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in
accordance with Clause 28 of WSA04-2005. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1,000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRC-W107.25 ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

**Definition of Rock**

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W107.26 BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 29 of WSA03-2005.

**WPRC-W107.27 LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 30 of WSA04-2005.
Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer’s written instructions, or as directed by the Superintendent.

**WPRC-W107.28 TRENCH STOPS**

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

**WPRC-W107.29 BULKHEADS**

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} (\%)} \text{ where } L = 80 \times \text{pipe length (m)} \text{ (450m max)}
\]

Where \( L > 100 \text{m} \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50% spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

**WPRC-W107.30 WRAPPING**

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion and using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.
Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25 mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.

Maintenance holes shall be constructed in accordance with WSA 04-2005 Clause 31.

The Contractor shall coat the internal surface of the rising main discharge maintenance hole and any other maintenance holes specified on the Drawings, with an approved epoxy.

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA04-2005 clause 30.5.

Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

Concrete encasement shall be undertaken in accordance with WSA04-2005 Clause 32.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.
Trench fill shall be undertaken in accordance with WSA04-2005 Clause 33.

Trench fill in trafficable areas 20mm crushed rock as per Clause SW-107.18. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause SW-107.18. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1)relative density of 60% or PSP/DCP penetration resistance of 7 blows per 300mm.

Trenchless construction of pipes shall be undertaken in accordance with WSA04-2005 Clause 30.8.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

Opposite each stop valve, scour valve and air valve the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the appurtenance is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.
The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.

Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centreline of the roadway.

**WPRC-W107.38 COMPACtion TESTING**

Compaction testing shall be carried out in accordance with WSA04-2005 Clause 36.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W107.39 HYDROSTATIC PRESSURE TESTING**

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA04-2005 Clause 36.5.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.

Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>4 hours</td>
</tr>
<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>4 hours</td>
</tr>
</tbody>
</table>
The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory is all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

**WPRC-W107.40 CONNECTION TO EXISTING SEWERS**

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in case where the pipes are greater than DN150 in size.

**WPRC-W107.41 RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA04-2005 Clause 35 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the
vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

**WPRC-W107.42  WORK AS-EXECUTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR .................................................................

CONTRACT .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
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<tr>
<td>G</td>
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</tbody>
</table>

Contractor .................................................................................................................................... (Signature)

........................................................................................................... (Date)

Received by - Superintendent .......................................................................................... (Signature)

........................................................................................................... (Date)

- Principal .................................................................................................................. (Signature)

........................................................................................................... (Date)
### Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2

<table>
<thead>
<tr>
<th>Section</th>
<th>Required Test Pressure</th>
<th>Actual Test Pressure</th>
<th>Test Start Time</th>
<th>Test Finish Time</th>
<th>Permitted Make-Up Water</th>
<th>Actual Make-Up Water</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
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<td>E</td>
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</tr>
</tbody>
</table>

Permitted make up water is determined by the formula \( Q (L/h) = 0.14LDH \) where \( L = \) pipeline length (km), \( D = \) pipeline diameter (m) and \( H = \) average test head over pipeline (m).

Witnessed by Superintendent .................................................................................................................................................................................. (Signature)

........................................................................................................................................................................Date

Contractor .................................................................................................................................................................................. (Signature)

........................................................................................................................................................................Date
### Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TEST DATE</th>
<th>WATER TEMPERATURE</th>
<th>TEST START TIME</th>
<th>TEST FINISH TIME</th>
<th>TEST PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make-up water added L ((\Delta V))</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Permitted make-up water is determined by the formula \(V_{all} \ (L/h) = 0.14LDH\) where \(L =\) pipeline length (km), \(D =\) pipeline diameter (m) and \(H =\) average test head over pipeline (m).

**ALLOWABLE MAKE-UP (\(V_{all}\))**

\(0.55 \times \Delta V_{(3h-2h)}\) at 3\(^{rd}\) hour + ALLOWABLE MAKE-UP (\(V_{all}\))

\(\Delta V_{(5h-4h)}\) at 5\(^{th}\) hour

PASS/FAIL

Witnessed by Superintendent .......................................................... (Signature)

.................................................................................................................. Date

Contractor .......................................................................................... (Signature)

.................................................................................................................. Date
TECHNICAL SCHEDULE

WPRC-W201

INSPECTION & INTERNAL CLEANING OF WATER RESERVOIRS
TECHNICAL SCHEDULE WPRC-W201 – INSPECTION & INTERNAL CLEANING OF WATER RESERVOIRS

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<th>CONTENTS</th>
<th>PAGE</th>
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</tr>
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<td></td>
</tr>
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<td></td>
</tr>
</tbody>
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WPRC-W201: INSPECTION & INTERNAL CLEANING OF WATER RESERVOIRS

WPRC - W201.1 SCOPE

This Specification applies to internal and external inspection and the internal cleaning of the Principal’s water supply reservoirs, while the reservoirs remain in service.

The purpose of reservoir cleaning is to remove any sediment that has built up on the reservoir floor since the last clean.

The Works includes submission of a report on the condition of each reservoir, to a standard suitable to update the Principal’s ASAM asset management system.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W201.2, unless specified otherwise herein.

Details of the reservoirs to be inspected and cleaned will be provided by the Principal.

WPRC - W201.2 REFERENCED DOCUMENTS AND STANDARDS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 2299 Occupational diving operations - Standard operational practice
AS 2815 Training and certification of occupational divers
AS 2865 Confined spaces
Safe Work Australia Confined Spaces Code of Practice (Feb 2014)

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA03 Water Supply Code of Australia
The Works for each reservoir include but are not limited to the following items:

a) Internal cleaning of reservoirs by suitably qualified divers, while the reservoirs remain in service

b) External inspection, reporting on the following:
   - Compound security
   - Vandalism
   - External ladder (safe condition and secure access)
   - Walls (leaks and corrosion)
   - Entry hatch (sealing and security)
   - Roof platforms (safe work area, rescue system)
   - Roof (sealing, corrosion, gutters, debris build up, drainage)
   - Ventilation
   - Handrails
   - Rescue frame
   - Bird & vermin proofing
   - Level indicator

c) Internal inspection, reporting on the following:
   - Walls (coating/liner condition)
   - Columns (structural supports)
   - Floor
   - Wall and floor joints
   - Internal Ladder
   - Inlet
   - Outlet
   - Scour
   - Overflow
   - Electrical components
   - Roof Framing &
   - Roof Spider
   - Sediment (if any – colour, composition, depth, etc.)
   - Any debris or foreign objects

The Work to be undertaken in accordance with the Conditions of Contract, this Specification, the Drawings listed, and under the supervision of the Superintendent.
WPRC - W201.4  ASSET CONDITIONS DEFINITIONS

The Principal has the following approved condition definitions for its Asset Management System. This should be referred to and adopted in the reporting of the condition of the reservoirs:

<table>
<thead>
<tr>
<th>Level</th>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Very Poor</td>
<td>Urgent renewal / upgrading required</td>
</tr>
<tr>
<td>4</td>
<td>Poor</td>
<td>Renewal required</td>
</tr>
<tr>
<td>3</td>
<td>Average</td>
<td>Maintenance work required</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Only minor maintenance work required</td>
</tr>
<tr>
<td>1</td>
<td>Excellent</td>
<td>No work required</td>
</tr>
</tbody>
</table>

WPRC - W201.5  QUALIFICATIONS

The minimum qualifications of staff employed on the Works by the Contractor including any subcontractors, shall be as follows:

- Divers shall be fully trained and certified in accordance with the requirements of AS2299 and NSW WorkCover which includes diving procedures, no decompression times with attention to depth, temperature, altitude and oxygen resuscitation combined with first aid;
- All Contract staff entering the reservoir or other confined space, shall be certified for confined space entry and rescue; and
- All Contract staff on site will have a full understanding of potable water operations, particularly hygiene and reservoir functions.

WPRC - W201.6  LABOUR, MATERIALS, PLANT & EQUIPMENT

The Contractor shall provide at his own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Works under the Contract.

Equipment used shall comply with the following:

- All equipment is to be used exclusively for potable water and shall be suitably disinfected prior to use;
- Divers shall operate in an hygienic dry suit and full face mask with filtered compressed air fed by umbilical hose attached to diver’s harness and connection bloc, which controls suit inflation and operation of emergency air supply;
- All equipment shall to be stored in a waterproof, dust-free and secure purpose built vehicle;
- Care is to be taken with transferring equipment from vehicle to the work site to avoid contamination;
- The compressor intake is to be positioned to avoid fumes from motors and other equipment in the vicinity;
- Lighting equipment shall be suitable for safe use in a wet environment.
WPRC - W201.7 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor's activities for the duration of the Contract.

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.
**WPRC - W201.8 RESERVOIR ENTRY**

Prior to entering a reservoir the following steps are to be completed:

- Notify the Principal’s Security Company, the Emergency Services and the Principal’s system operation staff and make them familiar with the work to be carried out;
- Conduct an external visual inspection of the reservoir infrastructure;
- Review the technical information on the reservoir supplied by the Superintendent (i.e. layout of internal fittings, sizes of pipe work and potential hazards);
- Review the operating features of the reservoir as detailed in information provided by the Superintendent (i.e. filling times and periods of maximum water flow leaving reservoir);
- Determine the presence of screens or guards on inlets/outlets;
- Determine the method for manually closing off the outlet flow in case of emergencies;
- Ensure that the valve key is on site;
- Isolate electrical equipment (mixers, cathodic protection, etc.) and pumps, inlet/outlet valves as necessary;
- Determine procedures for protection of existing reservoir infrastructure, working at heights;
- Prepare a communications plan between the diver, supervisors and emergency services;
- Prepare the dive plan;
- Fill out the diver worksheet and confined space entry permit. This includes standard Hazard Identification and Safe Work Procedures and Job Safety and Environmental Analysis (JSEA); and
- Disinfect all equipment and transfer to the reservoir working area near the entry point. Lay out the equipment on a clean surface area ready for use.

**WPRC - W201.9 RESERVOIR CLEANING**

Prior to commencement of internal cleaning of the reservoir, the Contractor shall undertake the following:

- Undertake a visual check and record details of the sediment before any cleaning commences. The type of sediment and the patterns it forms can give an indication of water movement, leaks and/or unusual contamination in the tank.
- Determine the vacuum head required to complete the job based on the type of sediment encountered;
- Determine the vacuum pattern by the reservoir internal layout, such as roof support posts, pipe work and construction of the floor;
- Confirm with the Superintendent shall advise of the particular aspects and internal features to be inspected and aspects likely to be of interest;
- The Contractor shall plan and carry out the Works to avoid erosion, contamination and sedimentation of the site and its surroundings. This may include but not be limited to the use of sediment socks, strainers or other items; and,
- If there is no suitable area for irrigation at the tank site, the water shall be tankered away for disposal in a suitable location identified by the Principal.
When cleaning the reservoir the following steps must be observed:

- Use the vacuum head to clear a working area for the diver to move without disturbing sediment;
- Maintain a visual check at all times for items that may be of interest to the Superintendent e.g. leaks, paint condition, poor positioning of fixtures and fittings.
- Use caution always in approaching the inlet/outlet areas. Common inlet/outlets can change flow directions without warning so the diver should always be aware of water movements when adjacent to a penetration;
- The diver to remain low and at least 2m away from a live outlet to avoid the suction area;
- Divers changing over shall brief their replacement diver on any details relating to safety likely to be encountered;
- Upon completion of cleaning, move all equipment to the entry point area and lift to the surface;
- Following cleaning all equipment shall be checked off to confirm that nothing has been left behind in the reservoir;
- Record details of the cleaning operation and any recommended improvements from the diver debriefing, for future use;
- The discharge hose shall be fitted with a strainer and a soaker hose. The water shall be used for site irrigation and under no circumstance discharged to stormwater or the sewerage system;

Upon completion of the work the Contractor shall:

- Notify the Principal’s operation staff and the Superintendent that the job is complete and the reservoir can be returned to normal functions (i.e. mixer and cathodic protection systems turned back on, isolated valves reopened, etc); and,
- Ensure that the reservoir and surrounding security arrangements are locked and the site left tidy.

**WPRC - W201.10 RECORDING AND REPORTING**

The Contractor shall record details of the reservoir inspection on the report pro-formas included in Appendix A unless an alternative format is agreed with the Superintendent. In addition to the written report, the Contractor shall also prepare and provide still photographs showing the internal condition of the reservoir and all key components covered by the inspection and CCTV footage of the interior of the reservoir in MPEG format.

Upon completion of the inspections a detailed report on the site is to be presented to the Superintendent including still photographs, videos and completed pro formas.
APPENDIX A – INSPECTION FORMS

ASAM R/T External and Internal Inspection
ASAM Coating Details Template
ASAM Cathodic Protection Template
ASAM Mixer Template
# ASAM R/T External and Internal Inspection

**Date**

**Job No.**

**Project No.**

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ASAM R/T Inspection Information Form  Version 2: December 2011  Aquafill Potable Diving  Sponsor: Managing Director

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**INSPECTION & INTERNAL CLEANING OF WATER RESERVOIRS  WPRC-W201-10**  WESTERN PLAINS REGIONAL COUNCIL
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ASAM HV Inspection Information Form
Version 2: December 2011
Aqualift Potable Diving
Sponsor: Managing Director

INSPECTION & INTERNAL CLEANING OF WATER RESERVOIRS WPRC-W201-11
WESTERN PLAINS REGIONAL COUNCIL
### ASAM Coating Details Template

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### Internal

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**Examples**

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<th><strong>Type</strong></th>
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# ASAM Cathodic Protection Template

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## Service

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*Version 1 - Jan 2011*
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Comments

Client Name:
Reservoir Name:
Location:
Report Date:
WS No
Report prepared by:
TECHNICAL SCHEDULE

WPRC-W102

CONSTRUCTION OF WATER RETICULATION
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APPENDIX A – HYDROSTATIC TESTING FORMS .................................................................................. 19
WPRC-W102: CONSTRUCTION OF WATER RETICULATION

WPRC-W102.1 SCOPE

This Specification applies to the construction of potable water reticulation mains up to and including DN 300mm after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W102.2, unless specified otherwise herein.

WPRC-W102.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

**Australian Standards**

AS 1111  ISO metric hexagon commercial bolts and screws
AS 1112  ISO metric hexagon nuts
AS 1214  Hot dipped galvanised coating on threaded fasteners
AS 1237  Plain washers for metric bolts, screws and nuts for general purposes
AS 1281  Cement mortar lining of steel pipe and fittings
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1477  PVC Pipes and fittings for pressure applications
AS 1627  Metal finishing
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2280  Ductile iron pressure pipe and fittings
AS 2566  Buried flexible pipelines
AS 2638  Cast iron sluice valves for waterworks purposes
AS 3952  Spring Hydrants for Waterworks Purposes
AS 3680  Polythene Sleevings for Ductile Iron Pipes
AS 3681  Application of polyethylene for ductile iron piping
AS 4020  Testing of products for use in contact with drinking water
AS 4087  Metallic Flanges for Waterworks Purposes
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4158  Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4441  Oriented PVC (PVC-O) pipes for pressure applications
AS 4680  Hot dip galvanised (zinc) coatings on fabricated ferrous articles
AS 4765  Modified PVC (PVC-M) pipes for pressure applications
AS 4791  Hot-dip galvanised (zinc) coatings on ferrous open sections, applied by an in-line process
AS 4792  Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
AS 4794  Non-return valves – swing check and tilting disc

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01  Polyethylene Pipeline Code
WSA03  Water Supply Code of Australia
N/A  WSAA Product Specifications

**WPRC-W102.3  STANDARDS**


**WPRC-W102.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 12.2 and 12.3 of WSA03-2011.

All pipe, fittings and associated mechanical equipment shall be suitable for the conveyance of potable water and shall meet the requirements of AS 4020.

**WPLR-W102.5  POLYVINYLCHLORIDE (PVC) PIPE**

PVC pipe shall be either:
- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.
All PVC pipe shall be:

- Minimum pressure class PN18.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured blue for potable water.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

**WPRC-W102.6 DUCTILE IRON PIPE AND FITTINGS**

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200 and cement lined in accordance with AS 1281 (DICL).

Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Ductile iron pipes and fittings shall be:

- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Externally coated with a bituminous or synthetic resin coating to AS 2280.
Polyethylene (PE) Pipe and Fittings

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:
- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN16.
- Coloured black with blue stripes for potable water
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

Stop Valves

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:
- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.

Hydrants

Hydrants shall be spring hydrants compliant with WSAA Product Specification WSA PS-267 and shall be:
- Manufactured in accordance with AS 3952.
- Minimum pressure class PN16.
- Provided with external and internal coating in accordance with AS 4158.
- Installed with a hydrant riser as required so that the face of the hydrant is between 75mm and 225mm below the top of the underside of the hydrant surface cover.

Non-Return Valves

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:
- Manufactured in accordance with AS 4794.
- Minimum pressure class PN16.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.
WPRC-W102.11 PRESSURE REDUCING VALVES

Pressure reducing valves shall be of a type, make and model as approved by the Principal and shall be installed in accordance with the manufacturer’s instructions. Pressure reducing and associated valves shall be installed in a below-ground pit.

WPRC-W102.12 MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W102.13 FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W102.14 FASTENERS

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W102.15 GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

WPRC-W102.16 TAPPING BANDS

Mechanical tapping bands for connecting property services to reticulation mains shall be compliant with WSAA Product Specification WSA PS-310.

WPRC-W102.17 METALWORK

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable.
WPRC-W102.18  CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379.

WPRC-W102.19  TRENCH FILL MATERIAL

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio $(R_D)$ of not less than 95%.

WPRC-W102.20  EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W102.21  LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves and hydrants are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W102.22  COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.

The maximum cover for water reticulation mains shall be 1500mm unless otherwise approved by the Superintendent.
WPRC-W102.23 CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor's responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W102.24 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 13 of WSA03-2011. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

WPRC-W102.25 ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.
Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W102.26 BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 14 of WSA03-2011.

**WPRC-W102.27 LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 15 of WSA03-2011.

Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation, the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer's written instructions, or as directed by the Superintendent.

Cutting of asbestos cement (AC) pipes is not permitted. The AC pipe must be excavated to the nearest pipe collars and the collars cracked. Once the collars are removed, a new section of DICL pipe shall be installed by use of gibault joints. The AC pipe materials shall be disposed of safely and in accordance with relevant legislation.
WPRC-W102.28  TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (ie 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[ \text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} \%} \]

WPRC-W102.29  BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[ \text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} \%} \text{ where } L = 80 \times \text{pipe length (m)} \text{ (450m max)} \]

Where \( L > 100\text{m} \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[ \text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} \%} \]

WPRC-W102.30  WRAPPING

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.

WPRC-W102.31  VALVE CHAMBERS

Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25 mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.
WPRC-W102.32  THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA03-2011 clause 15.7.

Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

WPRC-W102.33  CONCRETE ENCASEMENT

Concrete encasement shall be undertaken in accordance with WSA03-2011 clause 16.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

WPRC-W102.34  TRENCH FILL

Trench fill shall be undertaken in accordance with WSA03-2011 Clause 17.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause WPRC-W102.19. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.
Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W102.19. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

WPRC-W102.35 BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA03-2011 Clause 15.15.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

WPRC-W102.36 MARKERS

Opposite each stop valve, scour valve, air valve and hydrant the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the hydrant is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.

The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.
Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centreline of the roadway.

**WPRC-W102.37 SWABBING**

Swabbing of constructed pipelines in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.

**WPRC-W102.38 COMPACtion TESTING**

Compaction testing shall be carried out in accordance with WSA03-2011 Clause 19.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W102.39 HYDROSTATIC PRESSURE TESTING**

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.
Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
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</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

**WPRC-W102.40 DISINFECTION**

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all new pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

**WPRC-W102.41 CONNECTION TO EXISTING WATER MAINS**

The Principal shall determine whether connections to existing live water pipelines may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.
For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in a case where the pipes are greater than DN150 in size.

WPRC-W102.42 RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA03-2011 Clause 23 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

WPRC-W102.43 WORK AS-EXECUTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and AutoCAD DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.
If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR ............................................................................................................................... (Signature)

.............................................................................................................................(Date)

CONTRACT ............................................................................................................................... (Signature)

.............................................................................................................................(Date)

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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Contractor ............................................................................................................................... (Signature)

.............................................................................................................................(Date)

Received by - Superintendent ........................................................................................................ (Signature)

.............................................................................................................................(Date)

- Principal ............................................................................................................................... (Signature)

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CONTRACTOR ........................................................................................................................................

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Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2

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<tr>
<th>Section</th>
<th>Required Test Pressure</th>
<th>Actual Test Pressure</th>
<th>Test Start Time</th>
<th>Test Finish Time</th>
<th>Permitted Make-Up Water</th>
<th>Actual Make-Up Water</th>
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Permitted make up water is determined by the formula $Q \text{ (L/h)} = 0.14LDH$ where $L = \text{pipeline length (km)}$, $D = \text{pipeline diameter (m)}$ and $H = \text{average test head over pipeline (m)}$.

Witnessed by Superintendent ...........................................................................................................(Signature)

...............................................................................................................................................Date

Contractor ....................................................................................................................................(Signature)

...............................................................................................................................................Date

CONTRACTOR

CONTRACT

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION

TEST DATE

WATER TEMPERATURE

TEST START TIME

TEST FINISH TIME

TEST PRESSURE

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Permitted make-up water is determined by the formula $V_{\text{all}}$ (L/h) = 0.14LDH where $L$ = pipeline length (km), $D$ = pipeline diameter (m) and $H$ = average test head over pipeline (m).

ALLOWABLE MAKE-UP ($V_{\text{all}}$)

$0.55 \times \Delta V_{(3h-2h)}$ at 3rd hour + ALLOWABLE MAKE-UP ($V_{\text{all}}$)

$\Delta V_{(5h-4h)}$ at 5th hour

PASS/FAIL

Witnessed by Superintendent .......................................................... (Signature)

.......................................................... Date

Contractor .......................................................................................... (Signature)

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WESTERN PLAINS REGIONAL COUNCIL
Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W103

CONSTRUCTION OF WATER TRUNK MAINS
## TECHNICAL SCHEDULE WPRC-W103 – CONSTRUCTION OF WATER TRUNK MAINS

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**Appendix A – Hydrostatic Testing Forms**
WPRC-W103: CONSTRUCTION OF WATER TRUNK MAINS

WPRC-W103.1 SCOPE

This Specification applies to the construction of potable water trunk mains DN 300mm and above after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W103.2, unless specified otherwise herein.

WPRC-W103.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1111  ISO metric hexagon commercial bolts and screws
AS 1112  ISO metric hexagon nuts
AS 1214  Hot dipped galvanised coating on threaded fasteners
AS 1237  Plain washers for metric bolts, screws and nuts for general purposes
AS 1281  Cement mortar lining of steel pipe and fittings
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1477  PVC Pipes and fittings for pressure applications
AS 1579  Arc-welded steel pipes and fittings for water and wastewater
AS 1627  Metal finishing
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2280  Ductile iron pressure pipe and fittings
AS 2566  Buried flexible pipelines
AS 2638  Cast iron sluice valves for waterworks purposes
AS 3952  Spring Hydrants for Waterworks Purposes
AS 3680  Polythene Sleeving for Ductile Iron Pipes
AS 3681  Application of polyethylene for ductile iron piping
AS 4020  Testing of products for use in contact with drinking water
AS 4087  Metallic Flanges for Waterworks Purposes
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4158  Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4321  Fusion bonded medium-density polyethylene coating and lining for pipes and fittings
AS 4441  Oriented PVC (PVC-O) pipes for pressure applications
AS 4680  Hot dip galvanised (zinc) coatings on fabricated ferrous articles
AS 4765  Modified PVC (PVC-M) pipes for pressure applications
AS 4791  Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS 4792  Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
AS 4794  Non-return valves – swing check and tilting disc
AS 4795  Butterfly valves for waterworks purposes
AS 4956  Air valves for water supply

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01  Polyethylene Pipeline Code
WSA03  Water Supply Code of Australia
WSAA Product Specifications

**WPRC-W103.3  STANDARDS**


**WPRC-W103.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 12.2 and 12.3 of WSA03-2011.

All pipe, fittings and associated mechanical equipment shall be suitable for the conveyance of potable water and shall meet the requirements of AS 4020.
WPWRC-W103.5 POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be either:
- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.

All PVC pipe shall be:
- Minimum pressure class PN18.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured blue for potable water.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

WPWRC-W103.6 DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200 and cement lined in accordance with AS 1281 (DICL).

Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Ductile iron pipes and fittings shall be:
- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Externally coated with a bituminous or synthetic resin coating to AS 2280.
WPRL-W103.7  MILD STEEL CEMENT LINED (MSCL) PIPE AND FITTINGS

MSCL pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:

- Manufactured in accordance with AS 1579.
- Cement mortar lined in accordance with AS 1281.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

WPRL-W103.8  POLYETHYLENE (PE) PIPE AND FITTINGS

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:

- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN16.
- Coloured black with blue stripes for potable water
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

WPRL-W103.9  STOP VALVES – SLUICE VALVES

Unless noted otherwise, stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
WPRC-W103.10 STOP VALVES – BUTTERFLY VALVES

Where specified, butterfly valves shall be compliant with WSAA Product Specification WSA PS-263 and shall be:

- Manufactured in accordance with AS 4795.
- Minimum pressure class PN16.
- Double flanged unless noted otherwise.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Installed with trunnions horizontal and have a manual gearbox actuator (fully enclosed) suitable for buried service that can be operated from the surface.
- Provided with suitable stops to prevent overtravel of the disc beyond fully open and fully closed position.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.

WPRC-W103.11 HYDRANTS

Hydrants shall be spring hydrants compliant with WSAA Product Specification WSA PS-267 and shall be:

- Manufactured in accordance with AS 3952.
- Minimum pressure class PN16.
- Provided with external and internal coating in accordance with AS 4158.
- Installed with a hydrant riser as required so that the face of the hydrant is between 75mm and 225mm below the top of the underside of the hydrant surface cover.

WPRC-W103.12 AIR VALVES

Air valves shall be compliance with WSAA Product Specification WSA PS-265 and shall be:

- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with potable water.
- Installed with an isolation valve.
- Minimum diameter DN80mm.
WPRC-W103.13 NON-RETURN VALVES

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:

- Manufactured in accordance with AS 4794.
- Minimum pressure class PN16.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.

WPRC-W103.14 PRESSURE REDUCING VALVES

Pressure reducing valves shall be of a type, make and model as approved by the Principal and shall be installed in accordance with the manufacturer’s instructions. Pressure reducing and associated valves shall be installed in a below-ground pit.

WPRC-W103.15 MECHANICAL JOINTS

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

WPRC-W103.16 FLANGES

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

WPRC-W103.17 FASTENERS

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

WPRC-W103.18 GASKETS

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

WPRC-W103.19 TAPPING BANDS

Mechanical tapping bands for connecting property services to reticulation mains shall be compliant with WSAA Product Specification WSA PS-310.
WPRC-W103.20 METALWORK

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable.

WPRC-W103.21 CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379.

WPRC-W103.22 TRENCH FILL MATERIAL

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_0$) of not less than 95%.

WPRC-W103.23 EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W103.24 LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves and hydrants are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W103.25 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.
The maximum cover for water reticulation mains shall be 1500mm unless otherwise approved by the Superintendent.

**WPRC-W103.26  CROSSINGS**

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

**WPRC-W103.27  EXCAVATION**

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 13 of WSA03-2011. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRC103.28  ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor’s expense and the Contractor shall not be entitled to any extension of time due to such delay.
Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

WPRC-W103.29 BEDDING FOR PIPES

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 14 of WSA03-2011.

WPRC-W103.30 LAYING OF PIPES

Laying of pipes shall be undertaken in accordance with Clause 15 of WSA03-2011.

Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation, the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer's written instructions, or as directed by the Superintendent.

Cutting of asbestos cement (AC) pipes is not permitted. The AC pipe must be excavated to the nearest pipe collars and the collars cracked. Once the collars are removed, a new section of DICL pipe shall be installed by use of gibault joints. The AC pipe materials shall be disposed of safely and in accordance with relevant legislation.
WPRC-W103.31 TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

WPRC-W103.32 BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} (\%)} \quad \text{where} \quad L = 80 \times \text{pipe length (m)} \quad (450\text{m max})
\]

Where \( L > 100\text{m} \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} (\%)}
\]

WPRC-W103.33 WRAPPING

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.

WPRC-W103.34 VALVE CHAMBERS

Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.

WPRC-W103.35 THRUST AND ANCHOR BLOCKS AND RESTRAINED JOINTS

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA03-2011 clause 15.7.
Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

**WPRC-W103.36  CONCRETE ENCASEMENT**

Concrete encasement shall be undertaken in accordance with WSA03-2011 clause 16.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

**WPRC-W103.37  TRENCH FILL**

Trench fill shall be undertaken in accordance with WSA03-2011 Clause 17.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause WPRC-W103.22. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.
Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W103.22. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

WPRC-W103.38 BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA03-2011 Clause 15.15.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

WPRC-W103.39 PROTECTION

Where MSCL pipework is used, cathodic protection shall be installed as specified on the detail design. All cathodic protection works shall be installed by an experienced corrosion protection contractor.

All connections between dissimilar metals shall be insulated to ensure that dissimilar metals are electrically separated.

WPRC-W103.40 Markers

Opposite each stop valve, scour valve, air valve and hydrant the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the hydrant is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.
The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.

Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centerline of the roadway.

**WPRC-W103.41 SWABBING**

Swabbing of constructed pipelines in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.

**WPRC-W103.42 COMPACTION TESTING**

Compaction testing shall be carried out in accordance with WSA03-2011 Clause 19.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W103.43 HYDROSTATIC PRESSURE TESTING**

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.
Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:
(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

WPRC-W103.44 DISINFECTION

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all new pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

WPRC-W103.45 CONNECTION TO EXISTING WATER MAINS

The Principal shall determine whether connections to existing live water pipelines may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.
For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in a case where the pipes are greater than DN150 in size.

**WPRC-W103.46 RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA03-2011 Clause 23 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel or use trenchless methods to construct under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

**WPRC-W103.47 WORK AS-EXECUTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.
Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and AutoCAD DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR ...........................................................................................................

CONTRACT ...........................................................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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<tr>
<td>A</td>
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</tbody>
</table>

Contractor ...........................................................................................................

........................................................................................................... (Date)

Received by - Superintendent ...........................................................................................................

........................................................................................................... (Date)

- Principal ...........................................................................................................

........................................................................................................... (Date)

CONTRACTOR .................................................................

CONTRACT .................................................................

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**Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2**

<table>
<thead>
<tr>
<th>Section</th>
<th>Required Test Pressure</th>
<th>Actual Test Pressure</th>
<th>Test Start Time</th>
<th>Test Finish Time</th>
<th>Permitted Make-Up Water</th>
<th>Actual Make-Up Water</th>
<th>Pass</th>
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<tbody>
<tr>
<td>A</td>
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</table>

Permitted make up water is determined by the formula $Q \ (L/h) = 0.14LDH$ where $L$ = pipeline length (km), $D$ = pipeline diameter (m) and $H$ = average test head over pipeline (m).

Witnessed by Superintendent ........................................................................................................(Signature)  
.....................................................................................................................Date

Contractor ....................................................................................................................................(Signature)  
.....................................................................................................................Date

---

CONSTRUCTION OF WATER TRUNK MAINS  
WPRC-W103-21  
WESTERN PLAINS REGIONAL COUNCIL

CONTRACTOR .................................................................

CONTRACT .................................................................

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION .................................................................

TEST DATE .............................................................  WATER TEMPERATURE.................................

TEST START TIME ....................................................  TEST FINISH TIME ........................................

TEST PRESSURE ........................................................

<table>
<thead>
<tr>
<th>Section</th>
<th>1 hour</th>
<th>2 hours</th>
<th>3 hours</th>
<th>4 hours</th>
<th>5 hours</th>
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<tr>
<td>Make-up water added L (ΔV)</td>
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</table>

Permitted make-up water is determined by the formula $V_{all} \ (L/h) = 0.14LDH$ where $L$ = pipeline length (km), $D$ = pipeline diameter (m) and $H$ = average test head over pipeline (m).

ALLOWABLE MAKE-UP ($V_{all}$) ........................................

$0.55 \times ΔV_{(3h-2h)}$ at 3rd hour + ALLOWABLE MAKE-UP ($V_{all}$) ........................................

$ΔV_{(5h-4h)}$ at 5th hour ........................................

PASS/FAIL .............................................................

Witnessed by Superintendent ...........................................................(Signature)

.................................................................Date

Contractor .............................................................

.................................................................(Signature)

.................................................................Date
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W104

CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION
## TECHNICAL SCHEDULE WPRC-W104 – CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION

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WPRC-W104: CONSTRUCTION OF GRAVITY SEWERAGE RETICULATION

WPRC-W104.1 SCOPE

This Specification applies to the construction of gravity sewerage reticulation pipes (sewers) up to and including DN300mm, after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W104.2, unless specified otherwise herein.

WPRC-W104.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 681  Elastomeric seals
AS 1260  PVC-U pipes and fittings for drain, waste and vent application
AS 1289  Methods of testing soils for engineering purposes
AS 1379  Specification and supply of concrete
AS 1646  Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741  Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032  Code of Practice for installation of UPVC pipe systems
AS 2566  Buried flexible pipelines
AS 2758  Aggregates and rock for engineering purposes
AS 3879  Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996  Access covers and grates
AS 4130  Polyethylene (PE) pipes for pressure applications
AS 4198  Precast concrete access chambers for sewerage applications
AS 5065  Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

- **WSA01** Polyethylene Pipeline Code
- **WSA02** Gravity Sewerage Code of Australia
- **N/A** WSAA Product Specifications
- **WSA 114** Concrete Special Class
- **WSA 137** Maintenance Shafts and Maintenance Chambers for Sewerage

**International Standards**

- **EN 295** Vitrified clay pipe systems for drains and sewers. Requirements for pipes, fittings and joints
- **ATSM C990M-09** Standard specification for joints for concrete pipe, manholes and precast box sections using preformed flexible joint sealants (metric)

**WPRC-W104.3 STANDARDS**

Construction of the Work Under Contract (WUC) shall be undertaken in accordance with WSA02-2014 Gravity Sewerage Code of Australia, Part 2: Construction.

**WPRC-W104.4 DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 13.2 and 13.3 of WSA02-2014.

**WPRC-W104.5 POLYVINYLCHLORIDE (PVC) PIPE**

PVC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-230 and shall be:

- Unplasticised PVC (PVC-U) pipes for non-pressure applications.
- Manufactured in accordance with AS 1260.
- Minimum stiffness class SN8 for DN150 mm and above.
- Minimum stiffness class SN10 for DN100 mm.
- Either rubber ring jointed complying with AS 1646 or solvent cement jointed complying with AS 3879.
- Installed in accordance with AS 2032.
WPRC-W10.4.6 VITRIFIED CLAY (VC) PIPE AND FITTINGS

VC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:

- Manufactured in accordance with EN 295 or AS 1741.
- Minimum crushing strength of 34 kN/m for DN150 mm.
- Minimum class 160 for DN200 - 250 mm.
- Minimum class 120 for DN300 mm.
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

WPRC-W104.7 POLYPROPYLENE (PP) PIPE AND FITTINGS

PP pipes and fittings shall be compliant with WSAA Product Specification WSA PS-240 and shall be:

- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

WPRC-W104.8 POLYETHYLENE (PE) PIPE AND FITTINGS

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.

WPRC-W104.9 ACCESS COVERS

Access covers shall be compliant with WSAA Product Specification WSA PS-290 and shall be:

- Manufactured in accordance with AS 3996.
- Class D unless stated otherwise on the Drawings.
- Circular DN600 mm unless stated otherwise on the Drawings.
- Infilled with concrete (where required) in accordance with AS 3996. Concrete infill shall be a minimum of N32 and have a cement content of 400 kg/m³. Concrete infill shall be vibrated during installation to eliminate air pockets.
- Gas and water tight.
- Greased using approved sealing grease on all metal to metal seals after installation.
- Installed with vegetation rings where access covers are not located in a paved or sealed area.
WPRC-W104.10  STEP IRONS AND LADDERS

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

WPRC-W104.11  MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W12  MAINTENANCE CHAMBERS

Where maintenance chambers are permitted and specified on the Drawings, these shall be either approved:

- Concrete maintenance chambers compliant with WSAA Product Specification WSA PS-331.
- PP maintenance chambers compliant with WSAA Product Specification WSA PS-337.
- PE maintenance chambers compliant with WSAA Product Specification WSA PS-338.

Maintenance chambers shall have a nominal riser size between DN450 mm and DN600 mm and shall be compliant with WSA 137.
WPRC-W104.13 MAINTENANCE SHAFTS

Where maintenance shafts are permitted and specified on the Drawings, these shall be either approved:

- PE maintenance shafts compliant with WSAA Product Specification WSA PS-322.
- PP maintenance shafts compliant with WSAA Product Specification WSA PS-341.

Maintenance shafts shall have a nominal riser size between DN225 mm and DN375 mm and shall be compliant with WSA 137.

WPRC-W104.14 CONCRETE

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

WPRC-W104.15 TRENCH FILL MATERIAL

Trench fill in trafficable areas shall be 20 mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_o$) of not less than 95%.

WPRC-W104.16 EMBEDMENT MATERIAL

Embedment material shall be of the type and size as specified on the Drawings or as otherwise approved by the Superintendent.

- Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
- Embedment/5mm minus fine crushed rock shall be compliance with WSAA Product Specification WSA PS-361.
- Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.
- Well graded crushed rock shall be compliant with WSAA Product Specification WSA PS-362 and shall be of the nominal size specified on the Drawings.
- Single size crushed rock shall be compliant with WSAA Product Specification WSA PS-351 and shall be of the nominal size specified on the Drawings.
Careful selection of embedment material size is required where ribbed pipes such as PP are used. Manufacturer’s recommendations should be sought and the maximum particle size shall be less than the width between pipe ribs to ensure sufficient support can be provided.

**WPRC-W104.17 LOCATION**

The location, sizes, pipe class and other details of the sewers are shown on the Drawings. The location of maintenance structures are also shown on the Drawings. The pipelines and maintenance structures shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

**WPRC-W104.18 COVER OVER PIPES**

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 600 mm in non-trafficable locations.
- 750 mm in trafficable locations in private property (i.e. driveways).
- 900 mm under sealed roadways and footpaths.
- 1200 mm under major roadways.

**WPRC-W104.19 CROSSINGS**

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

**WPRC-W104.20 EXCAVATION**

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 14 of WSA02-2014. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000 mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate...
shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRCE-W104.21 ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor’s expense and the Contractor shall not be entitled to any extension of time due to such delay.

**Definition of Rock**

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W104.22 BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 15 of WSA02-2014.

**WPRC-W104.23 LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 16 of WSA02-2014.

Before being laid, all pipeline system items shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting.
WPRC-W104.24 TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

Trenchstop spacing (m) = 100 / Grade (%)

WPRC-W104.25 BULKHEADS

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

Bulkhead spacing (m) = L / Grade (%) where L = 80 x pipe length (m) (450m max)
Where L > 100m also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

Bulkhead spacing (m) = 100 / Grade (%)

WPRC-W104.26 PROPERTY CONNECTION SEWERS

Property connection sewers shall be constructions at the locations shown on the Drawings in accordance with WSA 02-2014 clause 16.7.

The termination of all property connection sewers shall be marked with non-detectable marking tape where an IO is not used.

WPRC-W104.27 MAINTENANCE STRUCTURES

Maintenance holes shall be constructed in accordance with WSA 02-2014 clause 17.

Maintenance chambers, shafts, inspection shafts and inspection openings shall be constructed in accordance with WSA 02-2014 clause 18.

Where specified on the Drawings, the Contractor shall coat the internal surface of maintenance holes with an approved epoxy.
WPRC-W104.28  CONCRETE ENCASEMENT

Concrete encasement shall be undertaken in accordance with WSA02-2014 clause 19.6.

Where pipes have less than 600mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.

WPRC-W104.29  TRENCH FILL

Trench fill shall be undertaken in accordance with WSA04-2014 Clause 20.1.

Trench fill in trafficable areas shall be 20mm crushed rock as per Clause SW-102.20. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause SW-102.20. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300 mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600 mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300 mm.
WPRC-W104.30  BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE

Trenchless construction of pipes shall be undertaken in accordance with WSA02-2014 Clause 16.12.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness.
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50 mm, then this shall be grouted with an approved grout mix.

WPRC-W104.31  COMPACTION TESTING

Compaction testing shall be carried out in accordance with WSA02-2014 Clause 21.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

WPRC-W104.32  AIR PRESSURE AND VACUUM TESTING OF SEWERS

All sewers shall be vacuum or air pressure tested in accordance with WSA02-2014 Clause 21.4. At no stage shall air pressure used exceed 50 kPa.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.
**WPRC-W104.33 VACUUM TESTING OF MAINTENANCE HOLES**

Concrete maintenance holes shall be vacuum tested in accordance with WSA02-2014 Clause 21.4.5 based on the following frequency.

<table>
<thead>
<tr>
<th>Number of each type of MHs in the project</th>
<th>Cast in-situ concrete - minimum % tested initially</th>
<th>Pre-cast concrete - minimum % tested initially</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>20%</td>
<td>100%</td>
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<tr>
<td>6 to 10</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>11 to 20</td>
<td>20%</td>
<td>33%</td>
</tr>
<tr>
<td>More than 20</td>
<td>20%</td>
<td>25%</td>
</tr>
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</table>

**WPRC-W104.34 DEFLECTION (OVALITY) TESTING OF FLEXIBLE SEWERS**

All flexible sewers shall be deflection (ovality) tested in accordance with WSA02-2014 Clause 21.6 at least 14 days after completion of placement and compaction of trench and embankment fill.

**WPRC-W104.35 CCTV INSPECTION**

All sewers shall be inspected internally by CCTV in accordance with WSA02-2014 Clause 21.8 and WSA02-2014 Appendix L.

CCTV inspection footage and report shall be submitted to the Superintendent in Wincan format.

**WPRC-W104.36 CONNECTION TO EXISTING SEWERS**

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Water Agency. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Water Agency, the Water Agency will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Water Agency will undertake the connection work. The Water Agency shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Water Agency may require longer notice in a case where the pipes are greater than DN150 mm in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 23 unless otherwise agreed with the Water Agency.
WPRC-W104.37 CONSTRUCTION TOLERANCES

All works shall be constructed within the tolerances as specified in WSA02-2014 clause 22.

WPRC-W104.38 WORK AS-EXECUTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.

WPRC-W104.39 RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA02-2014 Clause 24 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.
Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.
APPENDIX A – AIR PRESSSURE/VACUUM TESTING FORMS

Part A - Notification of Sewer Air Pressure/Vacuum Testing by Contractor

CONTRACTOR ………………………………………………………………………………..

CONTRACT ………………………………………………………………………………..

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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Contractor ........................................................................................................ (Signature)
                                                                                   (Date)

Received by - Superintendent .................................................................................. (Signature)
                                                                                   (Date)

- Principal ....................................................................................................... (Signature)
                                                                                   (Date)
**Part B1 – Report of Low Air Pressure or Vacuum Testing – Sewer Pipes**

**CONTRACTOR** .................................................................

**CONTRACT** .................................................................

**METHOD** Low air pressure / vacuum (cross out whichever is not applicable)

### Low Air Pressure / Vacuum Testing Results

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Length</th>
<th>Size (DN)</th>
<th>Start Time</th>
<th>Duration</th>
<th>Pass</th>
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<tbody>
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Start pressure shall be 24 kPa and allowable loss over the duration of the test shall be 7 kPa.

Witnessed by Superintendent ................................................................. (Signature)

................................................................. Date

Contractor ................................................................. (Signature)

................................................................. Date

RESULTS OF MAINTENANCE HOLE TESTING – AS PER WSA02-2014 CLAUSE SECTION 21.4.5

<table>
<thead>
<tr>
<th>MH No.</th>
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<th>MH Depth</th>
<th>Minimum Test Time (s)</th>
<th>Start Vacuum Pressure</th>
<th>Start Time</th>
<th>Duration</th>
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Witnessed by Superintendent ........................................................................................................... (Signature)
.............................................................................................................Date

Contractor .................................................................................................................................... (Signature)
.............................................................................................................Date

CONSTRUCTION - GRAVITY SEWERAGE RETICULATION          WPRC-W104-19          WESTERN PLAINS REGIONAL COUNCIL
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W105

CONSTRUCTION OF GRAVITY TRUNK SEWERS
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<td>WPRC-W105.4</td>
<td>Delivery, Transportation, Handling and Storage of Materials</td>
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<td>Glass Reinforced Plastic (GRP) Pipe</td>
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<td>Vitrified clay (VC) Pipe</td>
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<td>WPRC-W105.7</td>
<td>Polypropylene (PP) Pipe</td>
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<td>WPRC-W105.8</td>
<td>Polyethylene (PE) pipe and fittings</td>
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<td>WPRC-W105.9</td>
<td>Reinforced Concrete (RC) Plastic Lined Pipe</td>
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<td>WPRC-W105.10</td>
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<td>Step Irons and Ladders</td>
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WPRC-W105: CONSTRUCTION OF GRAVITY TRUNK SEWERS

WPRC-W105.1 SCOPE

This Specification applies to the construction of gravity trunk pipes (sewers) above DN300 mm and up to and including DN1200 mm, after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W105.2, unless specified otherwise herein.

WPRC-W105.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 681    Elastomeric seals
AS 1260   PVC-U pipes and fittings for drain, waste and vent application
AS 1289   Methods of testing soils for engineering purposes
AS 1379   Specification and supply of concrete
AS 1646   Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741   Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032   Code of Practice for installation of UPVC pipe systems
AS 2566   Buried flexible pipelines
AS 2758   Aggregates and rock for engineering purposes
AS 3571   Plastic piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) – pressure and non-pressure drainage and sewerage
AS 3879   Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996   Access covers and grates
AS 4058   Precast concrete pipes (pressure and non-pressure)
AS 4130   Polyethylene (PE) pipes for pressure applications
AS 4198   Precast concrete access chambers for sewerage applications
AS 5065   Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

- WSA01 Polyethylene Pipeline Code
- WSA02 Gravity Sewerage Code of Australia
- N/A WSAA Product Specifications
- WSA 113 Industry Standard for Reinforced Concrete Pipes with Flexible Thermoplastic Linings
- WSA 114 Concrete Special Class
- WSA 137 Maintenance Shafts and Maintenance Chambers for Sewerage

**International Standards**

- EN 295 Vitrified clay pipe systems for drains and sewers. Requirements for pipes, fittings and joints
- ISO 10467 Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin
- ATSM C990M-09 Standard specification for joints for concrete pipe, manholes and precast box sections using preformed flexible joint sealants (metric)

**WPRC-W105.3 STANDARDS**


**WPRC-W105.4 DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 13.2 and 13.3 of WSA02-2014.

**WPRC-W105.5 GLASS REINFORCED PLASTIC (GRP) PIPE**

GRP pipes shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:

- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings.
Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

**WPRC-W105.6 VITRIFIED CLAY (VC) PIPE**

VC pipes for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:

- Manufactured in accordance with EN 295 or AS 1741
- Minimum crushing strength of 34 kN/m for DN150 mm
- Minimum class 120 for DN375 - 450 mm
- Minimum class 95 for DN500 mm and larger
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

**WPRC-W105.7 POLYPROPYLENE (PP) PIPE**

PP pipes shall be compliant with WSAA Product Specification WSA PS-240 and shall be:

- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

**WPRC-W105.8 POLYETHYLENE (PE) PIPE AND FITTINGS**

PE pipes shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:

- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.

**WPRC-W105.9 REINFORCED CONCRETE (RC) PLASTIC LINED PIPE**

RC pipes shall be compliant with WSAA Product Specification WSA PS-233 and WSAA Industry Standard WSA 113:2002 and shall be:

- Manufactured in accordance with AS 4058.
- Minimum pipe load class 4.
- Internally lined with factory cast-in thermoplastic liner.
- Externally coated with epoxy when installed in corrosive soils.
- Rubber ring jointed complying with AS 1646.
- Provided without lifting holes which are not permitted.
**WPRC-W105.10  ACCESS COVERS**

Access covers shall be compliant with WSAA Product Specification WSA PS-290 and shall be:

- Manufactured in accordance with AS 3996.
- Class D unless stated otherwise on the Drawings.
- Circular DN600 mm unless stated otherwise on the Drawings.
- Infilled with concrete (where required) in accordance with AS 3996. Concrete infill shall be a minimum of N32 and have a cement content of 400 kg/m³. Concrete infill shall be vibrated during installation to eliminate air pockets.
- Gas and water tight.
- Greased using approved sealing grease on all metal to metal seals after installation.
- Installed with vegetation rings where access covers are not located in a paved or sealed area.

**WPRC-W105.11  STEP IRONS AND LADDERS**

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

**WPRC-W105.12  MAINTENANCE HOLES**

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

**WPRC-W105.13  CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.
**WPRC-W105.14 TRENCH FILL MATERIAL**

Trench fill in trafficable areas shall be 20 mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_0$) of not less than 95%.

**WPRC-W105.15 EMBEDMENT MATERIAL**

Embedment material shall be of the type and size as specified on the Drawings or as otherwise approved by the Superintendent.

- Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
- Embedment/5 mm minus fine crushed rock shall be compliance with WSAA Product Specification WSA PS-361.
- Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.
- Well graded crushed rock shall be compliant with WSAA Product Specification WSA PS-362 and shall be of the nominal size specified on the Drawings.
- Single size crushed rock shall be compliant with WSAA Product Specification WSA PS-351 and shall be of the nominal size specified on the Drawings.

Careful selection of embedment material size is required where ribbed pipes such as PP are used. Manufacturer’s recommendations should be sought and the maximum particle size shall be less than the width between pipe ribs to ensure sufficient support can be provided.

**WPRC-W105.16 LOCATION**

The location, sizes, pipe class and other details of the sewers are shown on the Drawings. The location of maintenance structures are also shown on the Drawings. The pipelines and maintenance structures shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.
WPRC-W105.17  COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 600 mm in non-trafficable locations.
- 750 mm in trafficable locations in private property (i.e. driveways).
- 900 mm under sealed roadways and footpaths.
- 1200 mm under major roadways.

WPRC-W105.18  CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W105.19  EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 14 of WSA02-2014. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1000 mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.
WPRC-W105.20  ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

WPRC-W105.21  BEDDING FOR PIPES

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 15 of WSA02-2014.

WPRC-W105.22  LAYING OF PIPES

Laying of pipes shall be undertaken in accordance with Clause 16 of WSA02-2014.

Before being laid, all pipeline system items shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting.

WPRC-W105.23  TRENCH STOPS

Trench stops shall be constructed on all pipes with a grade steeper than 5% (ie 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[ \text{Trenchstop spacing (m)} = \frac{100}{\text{Grade (%)}} \]
**WPRC-W105.24  BULKHEADS**

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{L}{\text{Grade} \ (%) \text{ where } L = 80 \times \text{pipe length (m)} \text{ (450m max)}} \\
\text{Where } L > 100\text{m also construct intermediate trench stops at spacing < } 100/\text{grade} \ (%)\]

For pipe grades between 30% and 50%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m)} = \frac{100}{\text{Grade} \ (%)}
\]

**WPRC-W105.25  MAINTENANCE HOLES**

Maintenance holes shall be constructed in accordance with WSA 02-2014 clause 17.

Where specified on the Drawings, the Contractor shall coat the internal surface of maintenance holes with an approved epoxy.

**WPRC-W105.26  TRENCH FILL**

Trench fill shall be undertaken in accordance with WSA04-2014 Clause 20.1.

Trench fill in trafficable areas shall be 20 mm crushed rock as per Clause WPRC-W105.14. Trench fill material shall be placed and compacted in layers not exceeding 200 mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100 mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause WPRC-W105.14. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300 mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600 mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1) relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300 mm.
**WPRC-W105.27  BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE**

Trenchless construction of pipes shall be undertaken in accordance with WSA02-2014 Clause 16.12.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) are not permitted within unsleeved boreholes. Trenchless installation of trunk sewers shall be undertaken using a specific jacking pipe or approved sleeve.

Where the annular void for the borehole exceeds 50 mm, then this shall be grouted with an approved grout mix.

**WPRC-W105.28  COMPACtion TESTING**

Compaction testing shall be carried out in accordance with WSA02-2014 Clause 21.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W105.29  AIR PRESSURE AND VACUUM TESTING OF SEWERS**

All sewers shall be vacuum or air pressure tested in accordance with WSA02-2014 Clause 21.4. At no stage shall air pressure used exceed 50 kPa.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

**WPRC-W105.30  VACUUM TESTING OF MAINTENANCE HOLES**

Concrete maintenance holes shall be vacuum tested in accordance with WSA02-2014 Clause 21.4.5 based on the following frequency.

<table>
<thead>
<tr>
<th>Number of each type of MHs in the project</th>
<th>Cast in-situ concrete - minimum % tested initially</th>
<th>Pre-cast concrete - minimum % tested initially</th>
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</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>20%</td>
<td>100%</td>
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<tr>
<td>6 to 10</td>
<td>20%</td>
<td>50%</td>
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<tr>
<td>11 to 20</td>
<td>20%</td>
<td>33%</td>
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<tr>
<td>More than 20</td>
<td>20%</td>
<td>25%</td>
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</table>
**WPRC-W105.31 DEFLECTION (OVALITY) TESTING OF FLEXIBLE SEWERS**

All flexible sewers shall be deflection (ovality) tested in accordance with WSA02-2014 Clause 21.6 at least 14 days after completion of placement and compaction of trench and embankment fill.

Trunk sewers smaller than DN750 mm may be tested using either a proving tool or an approved electronic instrument. Deflection testing of sewers DN750 mm or larger shall only be undertaken using an approved electronic instrument.

**WPRC-W105.32 CCTV INSPECTION**

All sewers shall be inspected internally by CCTV in accordance with WSA02-2014 Clause 21.8 and WSA02-2014 Appendix L.

CCTV inspection footage and report shall be submitted to the Superintendent in Wincan format.

**WPRC-W105.33 INSPECTION AND TESTING OF THERMOPLASTIC LINED RC SEWERS**

Inspection and testing of thermoplastic lined RC sewers shall be undertaken in accordance with WSA02-2014 Clause 21.9. This shall include visual inspection and probing of all field welds with a feeler gauge followed by spark testing.

**WPRC-W105.34 CONNECTION TO EXISTING SEWERS**

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Water Agency. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Water Agency, the Water Agency will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Water Agency will undertake the connection work. The Water Agency shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Water Agency may require longer notice in a case where the pipes are greater than DN150 mm in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 23 unless otherwise agreed with the Water Agency.

**WPRC-W105.35 CONSTRUCTION TOLERANCES**

All works shall be constructed within the tolerances as specified in WSA02-2014 clause 22.
WPWRC-W105.36  WORK AS CONSTRUCTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked “As-Executed” with the relevant date and revision number. The Work As-Executed Drawings are required to show all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the ‘As Constructed’ Drawings and documentation.

WPWRC-W105.37  RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA02-2014 Clause 24 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.
APPENDIX A – AIR PRESSSURE/VACUUM TESTING FORMS

Part A - Notification of Sewer Air Pressure/Vacuum Testing by Contractor

CONTRACTOR .......................................................................................................................... 

CONTRACT ............................................................................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
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Contractor .......................................................................................................................... (Signature)

.......................................................................................................................... Date

Received by - Superintendent .................................................................................................... (Signature)

.......................................................................................................................... (Date)

- Principal .......................................................................................................................... (Signature)

.......................................................................................................................... (Date)
**Part B1 – Report of Low Air Pressure or Vacuum Testing – Sewer Pipes**

CONTRACTOR ..........................................................................................................

CONTRACT ..........................................................................................................

METHOD Low air pressure / vacuum (cross out whichever is not applicable)

**Low Air Pressure / Vacuum Testing Results**

<table>
<thead>
<tr>
<th>Section</th>
<th>Start MH</th>
<th>End MH</th>
<th>Length</th>
<th>Size (DN)</th>
<th>Start Time</th>
<th>Duration</th>
<th>Pass</th>
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Start pressure shall be 24 kPa and allowable loss over the duration of the test shall be 7 kPa.

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Contractor ........................................................................................................ (Signature)

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CONTRACTOR

CONTRACT

Results of Maintenance Hole Testing – As per WSA02-2014 Clause Section 21.4.5

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CONSTRUCTION OF SEWAGE PUMP STATIONS
**TECHNICAL SCHEDULE WPRC-W106 – CONSTRUCTION OF SEWAGE PUMP STATIONS**

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DCC-W106: CONSTRUCTION OF SEWAGE PUMP STATIONS

GENERAL

WPBC-W106.1 SCOPE

This Specification applies to the construction of Sewage Pump Stations up to and including 200L/s after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause DCC-W106.2, unless specified otherwise herein.

WPBC-W106.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 681 Elastomeric seals – material requirements for pipe joint seals used in water and drainage applications
AS 1100 Technical drawing
AS 1102 Graphical symbols for electrotechnical documentation
AS 1111 ISO metric hexagon commercial bolts and screws
AS 1112 ISO metric hexagon nuts
AS 1237 Plain washers for metric bolts, screws and nuts for general purposes
AS 1260 PVC-U pipes and fittings for drain, waste and vent application
AS 1289 Methods of testing soils for engineering purposes
AS 1379 Specification and supply of concrete
AS 1579 Arc-welded steel pipes and fittings for water and waste-water
AS 1627 Metal finishing
AS 1646 Rubber joint rings for water supply, sewerage and drainage purposes
AS 1741 Vitrified clay pipes and fittings with flexible joints – sewer quality
AS 2032 Code of Practice for installation of UPVC pipe systems
AS 2280 Ductile iron pressure pipe and fittings
AS 2566 Buried flexible pipelines
AS 2638 Cast iron sluice valves for waterworks purposes
AS 2758 Aggregates and rock for engineering purposes
| AS 3571 | Plastic piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) – pressure and non-pressure drainage and sewerage |
| AS 3600 | Concrete structures |
| AS 3610 | Formwork for concrete |
| AS 3680 | Polythene sleeving for Ductile Iron Pipes |
| AS 3681 | Application of polyethylene for ductile iron piping |
| AS 3879 | Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings |
| AS 3996 | Access covers and grates |
| AS 4087 | Metallic Flanges for Waterworks Purposes |
| AS 4130 | Polyethylene (PE) pipes for pressure applications |
| AS 4198 | Precast concrete access chambers for sewerage applications |
| AS 4158 | Thermal-bonded polymeric coatings on valves and fittings for water industry purposes |
| AS 4321 | Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings |
| AS 4680 | Hot dip galvanised (zinc) coatings on fabricated ferrous articles |
| AS 4671 | Steel reinforcing materials |
| AS 4791 | Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process |
| AS 4792 | Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process |
| AS 4794 | Non-return valves – swing check and tilting disc |
| AS 4956 | Air valves for water supply |
| AS 5065 | Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications |
| AS 6401 | Knife gate valves for waterworks purposes |

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA01 Polyethylene Pipeline Code
WSA02 Gravity Sewerage Code of Australia
WSA04 Sewage Pumping Station Code of Australia
N/A WSA00 Product Specifications
WSA 101 Submersible pumps for sewerage pumping stations
WSA 113 Industry Standard for Reinforced Concrete Pipes with Flexible Thermoplastic Linings
WSA 114 Concrete Special Class
WSA 121 Biofilters for Odour Control
WSA 132 Access Covers for Water Supply and Sewerage
WSA 133 Lightweight Macro-Composite Access Covers and Frames
WSA 137 Maintenance Shafts and Maintenance Chambers for Sewerage
International Standards

EN 295  Vitrified clay pipe systems for drains and sewers. Requirements for pipes, fittings and joints

ISO 10467  Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin

ATSM C990M-09  Standard specification for joints for concrete pipe, manholes and precast box sections using preformed flexible joint sealants (metric)

WPRC-W106.3  STANDARDS

Construction of the Work Under Contract shall be undertaken in accordance with WSA04-2005 Sewage Pumping Station Code of Australia, Part 3: Construction.

MATERIALS

WPRC-W106.4  DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 20.5 and 20.7 of WSA04-2005.

All pipe, fittings, pumpsets, mechanical equipment and other associated mechanical equipment shall be suitable for the contact with untreated sewage.

WPRC-W106.5  PUMPSETS

Pumpsets shall be of the type, model and have performance and meet the required duty as specified on the Drawings. Submersible pumpsets shall be compliant with WSAA Product Specification WSA PS-400 and WSAA Specification WSA 101.

Pumpsets shall be supplied with all pump stools, cabling, guiderails, supports and chains. All guiderails, supports and chains shall be stainless steel grade 316.
WPRC-W106.6 POLYVINYLCHLORIDE (PVC) PIPE – NON PRESSURE

PVC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-230 and shall be:

- Unplasticised PVC (PVC-U) pipes for non-pressure applications.
- Manufactured in accordance with AS 1260.
- Minimum stiffness class SN8 for DN150 mm and above.
- Minimum stiffness class SN10 for DN100 mm.
- Either rubber ring jointed complying with AS 1646 or solvent cement jointed complying with AS 3879.
- Installed in accordance with AS 2032.

WPRC-W106.7 VITRIFIED CLAY (VC) PIPE AND FITTINGS – NON PRESSURE

VC pipes and fittings for non-pressure applications shall be compliant with WSAA Product Specification WSA PS-231 and shall be:

- Manufactured in accordance with EN 295 or AS 1741.
- Minimum crushing strength of 34 kN/m for DN150 mm.
- Minimum class 160 for DN200 - 250 mm.
- Minimum class 120 for DN300 mm.
- Rubber ring jointed complying with AS 1646 with root inhibiting compound.

WPRC-W106.8 POLYPROPYLENE (PP) PIPE AND FITTINGS – NON PRESSURE

PP pipes and fittings shall be compliant with WSAA Product Specification WSA PS-240 and shall be:

- Manufactured in accordance with AS 5065.
- Minimum stiffness SN10.
- Rubber ring jointed complying with AS 1646.

WPRC-W106.9 POLYETHYLENE (PE) PIPE AND FITTINGS – NON PRESSURE

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207 and WSA PS-208 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pipe Standard Dimension Ratio (SDR) of 17.
- Coloured solid black for gravity sewerage.
- Electrofusion or butt welded jointed.
WPRC-W106.10 GLASS REINFORCED PLASTIC (GRP) PIPE – NON PRESSURE

GRP pipes shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:

- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings.

Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

WPRC-W106.11 DUCTILE IRON PIPE AND FITTINGS - PRESSURE

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200. Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212. Ductile iron epoxy lined (DIEL) pipes and fittings shall be:

- Manufactured in accordance with AS 2280.
- Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Internally coated in accordance with AS 4158
- Externally coated with a bituminous or synthetic resin coating to AS 2280.

WPRC-W106.12 POLYETHYLENE (PE) PIPE AND FITTINGS - PRESSURE

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:

- Manufactured in accordance with AS 4130.
- Minimum pressure class PN10.
- Coloured black with white stripes for sewage.
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

WPRC-W106.13 STAINLESS STEEL PIPEWORK – PRESSURE

Stainless steel (SS) pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 as applicable and shall be:

- Grade 316 unless noted otherwise on the drawings.
- Fabricated in the factory. In general site welding will not be permitted. Restricted site welding may be allowed at the discretion of the Superintendent.
- A minimum pipe wall thickness as per Schedule 10 of ANSI/ASME B36.10 Welded and Seamless Wrought Steel Pipe.
**WPRC-W106.14 MILD STEEL PIPES AND FITTINGS - PRESSURE**

Mild Steel Epoxy Lined (MSEL) pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:
- Manufactured in accordance with AS 1579.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Internally coated in accordance with AS 4158
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller.
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

**WPRC-W106.15 STOP VALVES**

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:
- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
- Provided with a handwheel where installed within a pit or above ground.

**WPRC-W106.16 KNIFE GATE VALVES**

Knife gate valves shall be in compliance with WSAA Product Specification WSA PS-266 and shall be:
- Manufactured in accordance with AS 6401.
- Stainless steel grade 316.
- Lugged type.
- Minimum pressure rating PN10.
- Clockwise closing.
- Non rising stem.

**WPRC-W106.17 AIR VALVES**

Air valves shall be in compliance with WSAA Product Specification WSA PS-275 and shall be:
- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with sewage.
- Installed with an isolation valve.
- Minimum diameter DN80mm.
**WPRC-W106.18  NON-RETURN VALVES**

Non-return valves shall be compliant with WSAA Product Specification WSA PS-264 and shall be:
- Manufactured in accordance with AS 4794.
- Minimum pressure class PN10.
- Full bodied swing check type.
- Provided with external and internal coating in accordance with AS 4158.

**WPRC-W106.19  MECHANICAL JOINTS**

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

**WPRC-W106.20  FLANGES**

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

**WPRC-W106.21  FASTENERS**

All bolts, nuts and washers shall be stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

**WPRC-W106.22  GASKETS**

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

**WPRC-W106.23  METALWORK**

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable where not in contact with sewage. Where located in contact with sewage metalwork shall be stainless steel grade 316.

**WPRC-W106.24  ACCESS COVERS**

Ductile Iron access covers and frames where specified shall be compliant with WSAA Product Specification WSA PS-290 and WSAA Specification WSA 132. These shall be manufactured in accordance with AS 3996 and shall be greased using an approved sealing grease on all metal to metal seals after installation.

Macro-composite access covers and frames where specified shall be compliant to WSAA Product Specification WSA PS-292 and WSA 133.
Aluminium access covers where specified shall be in accordance with the details provided on the Drawings. Aluminium covers shall have sufficient strength and stiffness for pedestrian loading (not traffic) and shall be protected from incurring traffic loading. Aluminium covers shall be lockable and designed to be safely opened by one person.

All access covers shall be gas and water tight and shall be of the size and class as specified on the Drawings. Unless noted otherwise, all access covers shall have stainless steel or FRP safety grate underneath for fall protection.

**WPRC-W106.25  STEP IRONS AND LADDERS**

Where specified, step irons shall comply with WSAA Product Specification WSA PS-314 and shall be either plastic encapsulated or stainless steel grade 316.

Where specified, fixed ladders shall comply with WSAA Product Specification WSA PS-315 and shall be either stainless steel grade 316 or fibre reinforced plastic.

**WPRC-W106.26  MAINTENANCE HOLES**

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

**WPRC-W106.27  CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

Reinforcement shall be compliance with AS 4671.
WPRC-W106.28 TRENCH FILL MATERIAL

Trench fill in trafficable areas shall be 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_d$) of not less than 95%.

WPRC-W106.29 EMBEDMENT MATERIAL

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.

WPRC-W106.30 MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m$^3$.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W106.31 EPOXY COATING

Epoxy coating shall be of the type and installed at the locations specified on the Drawings and or/Project Specification. Epoxy costing shall be installed in accordance with the manufacturers recommendations and requirements including preparation of concrete surfaces and application of all necessary primers/undercoats and coatings.
EARTHWORKS

WPRC-W106.32  EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in accordance with Clause 28 of WSA04-2005.

For trenches, minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1,000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

Where the bottom of an excavation is soft or considered to provide an unacceptable foundation, the Contractor shall seek instruction from the Superintendent and then undertake foundation stabilisation in accordance with Clause 28.8 of WSA04-2005.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with Technical Schedule SW-101 General Construction.

WPRC-W106.33  ROCK EXCAVATION

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

Definition of Rock

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material that can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.
Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W106.34  BACKFILL**

Backfilling shall be undertaken in accordance with WSA04-2005 Clause 33.

Backfill shall be placed and compacted in even layers on either side of structures to avoid differential loading. Backfill containing boulders, large rocks, logs, stumps, tree loppings, builders refuse, broken concrete and other like material is expressly forbidden.

All dewatering systems shall be kept operating during backfilling so that no fill material is placed or compacted under water. At all times ensure that the pipelines and structures are not damaged or moved during placement and compaction of fill.

Unless specified otherwise, backfill material/trench fill in trafficable areas 20mm crushed rock as per Clause DCC-W106.28. Fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Unless specified otherwise, backfill material/trench fill in non-trafficable areas may be select excavated or imported material complying with Clause DCC-W106.28. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1 relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

**CONCRETE WORKS**

**WPRC-W106.35  BEDDING FOR STRUCTURES AND PIPES**

Bedding for structures and pipes shall be provided in accordance with Clause 29 of WSA04-2005 where required.
WPRC-W106.36  WET-WELLS

Wet-wells shall be constructed in accordance with WSA 04-2005 clause 31.

The Contractor shall coat the internal surface of the wet-well with an approved epoxy, unless specified otherwise on the Drawings.

WPRC-W106.37  MAINTENANCE HOLES

Maintenance holes shall be constructed in accordance with WSA 04-2005 clause 31.

The Contractor shall coat the internal surface of the rising main discharge maintenance hole and any other maintenance holes specified on the Drawings, with an approved epoxy.

WPRC-W106.38  CONCRETE - GENERAL

Concrete works including delivery, formwork, reinforcement and placement shall be undertaken in accordance with Clause 20.10 of WSA04-2005.

WPRC-W106.39  CONCRETE DELIVERY

The concrete for every part of the WUC shall be supplied as ready-mixed concrete supplied in accordance with AS 1379, except where modified by the Project Specification or Drawings. Delivery of ready-mixed concrete in non-agitating trucks will not be permitted.

Each truck of ready-mixed concrete shall be accompanied by a docket bearing the following information:

- The specific part of the WUC for which the concrete was ordered and is intended.
- The quantity of concrete contained.
- The time of dispatch.
- The type of concrete supplied, including details of:
  - Type of cement
  - Slump
  - Maximum aggregate size
  - Concrete characteristic strength f’c
  - Admixtures used

The Contractor shall retain these dockets as a record of the ready-mixed concrete delivered, and this information shall be provided to the Superintendent on request.

Under no circumstances will hand mixed concrete be permitted.

Concrete shall not be placed when the site ambient temperature exceeds 30°C or is forecast to exceed 30°C during the day the concrete is to be placed. Under no circumstances shall the concrete be supplied at a temperature less than 5°C.
WPRC-W106.40 CONCRETE PLACEMENT

Placement of concrete in each section shall be in one continuous operation or until an authorised construction joint is reached. Concrete shall not be dropped freely from a height exceeding 1,200mm except where obstructions prevent and in such cases pour to the approval of the Superintendent and in such a way as to prevent segregation and to ensure an unbroken stream of concrete.

Concrete shall be placed between construction joints as shown on the design drawings. Maximum pour lengths shall be 14m for base and wall pours.

Preparation of concreting shall be such that all operations can be carried out without damaging or displacing reinforcement or formwork. Ensure surfaces against which concrete is to be placed are clean, moist (if absorbent), free from laitance and other coatings and free of weak or loose material. In hot weather, cool non-absorbent surfaces by watering and remove excess.

Concrete shall be placed in maximum 300mm layers such that each succeeding layer is blended into the preceding one by the compaction process. No layer shall be tapered off but shall be stopped against tight forms to produce square ends and shall be so moulded by inset formwork that the construction joint will finish approximately square to all exterior surfaces.

WPRC-W106.41 CONCRETE COMPACTION

The Contractor shall use immersion and screed vibrators accompanied by hand methods as appropriate and form vibrators where use of immersed vibrators is impracticable. Concrete shall be fully compacted and entrapped air removed. Vibrators shall not be permitted to come into contact with partially hardened concrete, or reinforcement embedded in it. Vibrators shall not be used to move concrete along the forms. Insert at points maximum 500 mm apart. The Contractor shall provide the Superintendent with details of proposed methods of compaction.

The total compacting capacity in cubic metres of concrete per hour of all vibrators in effective operating condition and employed in concrete compaction works, shall be based on a rated capacity of 80% of the manufacturer's recommendation for each type of vibrator in operation, and the total compacting capacity so computed shall be not less than the maximum rate at which concrete is placed. Vibrators shall be capable of transmitting vibrations to the concrete at frequencies between 6,000 and 12,000 impulses per minute and shall visibly affect the concrete at a radius of 300mm. Hold in reserve at least one vibrator in working order with one extra for each four vibrators in use. Avoid over-vibration. Do not allow vibrators to remain in any one position for more than 20 seconds.

WPRC-W106.42 CONCRETE TESTING

The Contractor shall arrange for concrete sampling and testing, including transportation of cylinders. For concrete supply of over 1m³, a minimum of 2 cylinders shall be taken. A Slump Test shall also be carried out at the time that the cylinders are taken.

Sampling and testing shall be in accordance with relevant Australian Standards, using NATA certified tests. The cost for all these works shall be borne by the Contractor.
The Contractor shall ensure that tolerance requirements for formwork are in accordance with the specification.

All formwork shall be designed, constructed and stripped in accordance with AS 3610.

All formed surfaces, except where permanently concealed by backfill material, shall have a minimum surface finish of Class 2 in accordance with AS 3610.

All formed finishes that are permanently concealed by backfill material, shall have a minimum surface finish of Class 3 in accordance with AS 3610.

All unformed surfaces shall comply with AS 3600. All unformed surfaces except roofs and footpaths shall have steel trowel or power float finish generally free of trowel marks. The finished concrete surfaces shall be true to the planes with tolerances not exceeding 6mm in 3m and abrupt not exceeding 2mm anywhere on the surface. All other surfaces shall be wood float finished to the same tolerances as above. All edges and re-entrant corners shall be provided with 20mm chamfers or fillets.

Freshly cast concrete shall be protected from premature drying and excessively hot or cold temperatures. In windy conditions windbreaks shall be erected to shield the concrete surfaces during and after placement. The concrete shall be maintained at a reasonable constant temperature with minimum moisture loss for the curing period. The curing method shall be as specified in the Project Specification or as otherwise approved by the Superintendent.

The provision of coreholes and embedments shall be in accordance with the requirements of Section 14 of AS 3600, except as specified otherwise.

The Contractor shall verify location and sizes shown on concrete drawings and submit details of departures to the Superintendent. The Contractor shall provide sufficient notice to the Superintendent (not less than 24 hours) to enable inspection of the holes and fixings.

Holes for services and other purposes shall be blocked out and sleeves, bolts and other attachments required securely fixed in position before concrete is placed.

All inserts, anchor bolts and embedded fixings shall be grade 316 stainless steel unless otherwise indicated on the Drawings. No embedded pipe or fixing shall be aluminium. Set holding down bolts accurately to the positions and levels shown on the Drawings or required by the components to be installed and rigidly held in position by attachment to suitable templates while concrete is being poured. Reinforcement shall not be cut to provide space for embedded items or displace it without approval.
Where pipes are to pass through concrete and in the opinion of the Superintendent watertightness or load bearing capacity is not of prime importance the Contractor shall leave a hole in the wall large enough to allow the pipe fitting flange to pass through but not more than 50mm larger than the flange. After the pipe fitting has been aligned correctly to match its connecting pipework the Contractor shall caulk the space around the pipe with dry pack mortar or S40 concrete and finish by stoning or otherwise to match the adjoining concrete.

Where pipes or other fittings are to pass through water retaining concrete or in the opinion of the Superintendent require to be securely fixed because of structural loading the Contractor shall fix the pipes or fittings through the formwork and cast them into the structure when placing the concrete. All paint and loose surface material shall be removed from such pipes and fittings over the surface to be embedded by wire brushing or other approved means. Unless otherwise specified or shown on the Drawings tolerances shall be ±10mm.

Cutting or drilling holes in concrete and the attachment or insertion of fittings after the concrete has set unless required by the Specification or Drawings shall only be carried out with the approval of the Superintendent.

Drilled anchor type fixings and fixings by explosive tools shall only be used if approved by the Superintendent.

**WPRC-W106.46 CONSTRUCTION JOINTS**

Construction joints shall be to AS3600, Clause 19.4.1 and provided at the locations as specified or as shown on the Drawings.

Before fresh concrete is placed against hardened concrete at construction joints, the joint surface of the hardened concrete shall be thoroughly roughened by mechanical or wet cut means and cleaned so that all loose or soft material, all foreign matter, and all laitance are removed. Immediately ahead of concrete placement, the joint surfaces shall be dampened and shall not be allowed to dry out before placing the fresh concrete.

If the desired locations of construction joints are not specified or shown on the Drawings, the Contractor shall submit to the Superintendent at least one week before commencing the placement of concrete in a section of the WUC the proposed locations of construction joints.

In general construction joints shall be perpendicular to the main reinforcement. Construction joints in cantilever slabs are not permitted. All construction joints in new concrete shall be formed either on horizontal or vertical planes unless otherwise shown on the Drawings.

Before fresh concrete is placed at a construction joint, roughen and clean the hardened concrete surface of the joint, so that all loose or soft material, foreign matter and laitance is removed to expose clean coarse aggregate. Just prior to placement, dampen the hardened concrete surface, without leaving free water.

Unless otherwise specified, butt join the surfaces of adjoining pours. Surfaces/edges that remain visible, to AS 3610, physical quality requirements, Class 2.
In order to minimise shrinkage effects of the concrete, the Drawings and this Technical Schedule require certain minimum periods to elapse between adjacent pours of concrete at joints. These periods shall not be varied without the approval of the Superintendent. Where time periods between pours are not indicated in the contract documents the Contractor shall submit their requirements in this regard to the Superintendent for examination and approval.

The time delay between concrete pours abutting vertical construction joints in walls shall not be less than 3 days. The time delay between concrete pours abutting horizontal construction joints in walls shall not be less than 3 days. The time delay between “pour strip” concrete and adjoining concrete shall not be less than forty five (45) days.

**PIPEWORK**

**WPRC-W106.47  GRAVITY SEWERS**

The construction of gravity sewers shall be undertaken in accordance with either of the following Technical Schedules as relevant to the WUC:

- SW-104 Construction of Gravity Reticulation Sewers
- SW-105 Construction of Gravity Trunk Sewers

**WPRC-W106.48  SEWAGE RISING MAINS**

The construction of sewage rising mains and pressure pipework shall be undertaken in accordance with Technical Schedule DCC-W107 Construction of Sewage Rising Mains.

**WPRC-W106.49  POTABLE WATER**

The construction of potable water works for the Sewage Pump Station shall be undertaken in accordance with Technical Schedule SW-102 Construction of Water Reticulation and AS 3500 as applicable.

**WPRC-W106.50  MISCELLANEOUS PIPEWORK**

Miscellaneous pipework such as vent pipework and conduits shall be constructed as detailed on the Drawings and in accordance with the relevant Standards.

Unless specified otherwise on the Drawings or relevant standards, the minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.
METALWORK

WPRC-W106.51 METALWORK GENERAL

Metalwork shall be undertaken in accordance with the relevant Australian Standards and Clause 25 of WSA04-2005.

The Contractor shall use metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Incompatible metals shall be separated using concealed layers of suitable materials in appropriate thicknesses. Fasteners shall be used so that they transmit the loads and without causing galvanic corrosion.

For copper and copper alloys only copper or copper-alloy fixing devices shall be used. For aluminium and aluminium alloys only aluminium alloy or non-magnetic stainless steel fixing devices shall be used. For stainless steel only appropriate stainless steel materials shall be used.

The Contractor shall fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces shall be kept clean, neat and free from burrs and indentations. Sharp edges shall be removed without excessive radiusing. Joints shall accurately fitted to a fine hairline. Bends shall be formed in tube without visibly deforming the cross section.

For colour finished work, colours of sheets, extrusions and heads of fasteners shall be matched.

Thermal movement shall be accommodated for in joints and fastenings.

SITE WORK

WPRC-W106.52 ACCESS ROADS AND HARDSTAND AREAS

Access roads and hardstand areas shall be constructed in accordance with the Drawings and Clause 26 of WSA04-2005 along with any other applicable Standards.

WPRC-W106.53 RETAINING WALLS

Where retaining walls are required, these shall be constructed in accordance with the Drawings and Clause 27 of WSA04-2005 for timber cantilever and concrete crib wall type retaining walls.

WPRC-W106.54 FENCING

Where specified, site fencing shall be provided in accordance with the Drawings.
WPRC-W106.55  RESTORATION

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA04-2005 Clause 35 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the WUC would not be objectionable, the surplus material may be disposed by spreading neatly in the vicinity of the WUC to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

MECHANICAL INSTALLATION

WPRC-W106.56  GENERAL

Mechanical installation of pumps, valves and fittings shall be undertaken in accordance with the Drawings, Project Specification and Clause 24 of WSA04-2005.

ELECTRICAL AND TELEMETRY WORKS

WPRC-W106.57  SCOPE

The scope of the electrical and telemetry works shall be as detailed throughout the project documentation including Drawings and Specification. Unless specified otherwise, this shall include the furnishing of all labour, materials, equipment and services for the design, documentation, manufacture, supply, installation, programming, configuration, testing, commissioning and hand-over of the complete and operable electrical, control, instrumentation, PLC, telemetry and SCADA systems.
WPRC-W106.58  ELECTRICAL GENERAL

The Contractor shall carry out the Electrical Works in accordance with the requirements of:
- Project Specification and Drawings (where applicable).
- Clause 21 of WSA04-2005.
- Wiring Rules AS/NZS 3000.
- Service Rules of the Supply Authority.
- All relevant Statutory Authorities.
- The Principal.

WPRC-W106.59  TELEMETRY GENERAL

The Contractor shall carry out the Telemetry Works in accordance with the requirements of:
- Project Specification and Drawings (where applicable).
- Clause 22 of WSA04-2005.
- Wiring Rules AS/NZS 3000.
- Service Rules of the Supply Authority.
- All relevant Statutory Authorities.
- The Principal.

WPRC-W106.60  SCADA SYSTEMS

The WUC shall be integrated into the Principal’s existing SCADA systems by the Contractor to provide supervisory control and monitoring of the new works as specified, in accordance with the Principal’s SCADA standards and to provide the overall plant performance functionality specified.

The SCADA systems shall be arranged for remote operation from the Principal’s remote SCADA workstations.

The Contractor shall engage one of the Principal’s approved SCADA Contractors to undertake the configuration and programming of the SCADA systems.

Upgrading of the Principal’s SCADA package licence shall by undertaken separately by the Principal unless specified otherwise. The Contractor shall submit draft display layouts for approval prior to commencement of programming and configuration of the displays.

It shall be possible for operators to inhibit some of the specified alarms if required.

SCADA trending of all analogue inputs shall be provided.

All flow signals shall be totalised and monthly and yearly totals recorded on SCADA.
WPRC-W106.61  CONTRACTOR’S DRAWINGS AND DATA

Drawings and Data

Drawings and data to be submitted by the Contractor, and its sub-contractors, shall include the following:

- Certified Design Drawings and information.
- Manufacturing Drawings.
- Emergency generator drawings and data (where applicable).
- Detailed 'As-Executed' Drawings and Documents.

All drawings shall be prepared generally in accordance with the recommendations of AS 1100 or AS 1102 as appropriate. Unless otherwise specified, symbols and abbreviations shown on drawings supplied by the Contractor shall be:

- As shown on the Contract Drawings supplied by the Principal.
- In accordance with the referenced standards.

All drawings submitted by the Contractor shall be prepared using AutoCAD release 2013 and electronic copies shall be provided in PDF and DWG format.

The format, content and layout of the drawings shall be similar and at least equivalent to those included in the Contract documents. The Contractor’s drawing sheets shall be of similar layout to the Principal's Drawing sheets and shall use drawing numbers allocated by the Principal.

Within 7 days of the Letter of Acceptance, the Contractor shall prepare and submit a schedule of drawings it intends to prepare for the whole of the WUC.

Acceptance by the Superintendent of any drawings or descriptive materials shall not relieve the Contractor of his responsibility for any errors therein or his responsibility to complete the WUC in accordance with the Contract. Such acceptance shall be considered to mean only that the Superintendent has no objection to the Contractor using, upon his own full responsibility, the plan or method of work proposed, or furnishing the materials and equipment proposed.

Certified Design Drawings and Certified Design Information

The Contractor shall submit design drawings and information certified to an acceptable standard as being an accurate description of the plant or equipment supplied under the Contract.
The Contractor shall submit the following documentation prior to the Contractor commencing any related work associated with procurement, construction or manufacture:

- Detailed single line diagrams of all power supply systems.
- Circuit diagrams of each item of equipment and system supplied under the Contract. These shall include updating of the Contract Drawings with additional details including: - addition of model/part numbers, terminal numbers, wire numbers and the like.
- PLC drawings including input/output circuit diagrams and rack layout drawings.
- PLC interface circuit drawings.
- Instrumentation loop drawings.
- Alarm listings.
- Functional specification and data table layout of PLC systems.
- Detailed arrangement drawings of the cubicle/cabinets and panels showing general arrangement, major dimensions, masses, locations of terminal boxes, and all service connections.
- Shop drawings for the switchgear including material lists, general arrangements, front views, assembly drawings, foundation plans, circuit diagrams and wiring and connection diagrams. Overall dimensions, minimum clearances and door swings shall be shown for all equipment.
- Detailed listing and catalogue information and technical data for all electrical equipment, items and devices to be provided by the Contractor.
- Arrangement of floor and foundation openings and other foundation details required for panels and cubicles/cabinets.
- Detailed arrangement drawings of all other items of equipment supplied by the Contractor under the Contract.
- A Schedule of Labels for equipment and devices.
- Proposed testing and commissioning procedure, and list of specified test equipment.

Manufacturing Drawings

During the Contract, the Contractor shall submit drawings of the various items of equipment to be supplied by the Contractor. These drawings shall include those used for manufacturer, such as all design and shop drawings.

Contractor shall submit for approval, shop drawings of the switchgear, control cubicle/cabinets and panels showing:

- The general arrangement including detailed layout of all equipment and connections.
- Structural and enclosing elements including sheet metal and sealing details.
- Type and rating of equipment items.
- Terminal block layouts and identification.

Work As-Executed Drawings and PLC and SCADA Programs

The Contractor shall maintain an up-to-date 'Work As-Executed' record of the WUC during manufacture and installation and comply with section SW-106.70. Copies of the marked up drawings and programs shall be provided in the switchboard and control panel at each site at all times.

Details included on Work As-Executed Drawings shall include the addition of model/part numbers, terminal numbers, wire numbers and the like.
Work As-Executed Drawings PLC and SCADA programs shall be provided to Principal in the formats (including electronic format) previously specified and shall include all drawings and documentation prepared as part of this Contract.

The latest revision of the as installed PLC program shall be provided as both a paper copy and a full listing (with descriptors) as an electronic copy. These shall include the complete program and documentation listings with address and rung comments and symbols.

**ACCEPTANCE TESTING AND COMMISSIONING**

**WPRC-W106.62 COMPACATION TESTING**

Compaction testing shall be carried out in accordance with WSA04-2005 Clause 36.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W106.63 PRESSURE PIPEWORK TESTING**

All pressure pipelines greater than 20m in length shall be hydrostatically pressure tested in accordance with Technical Schedule SW-102 Construction of Water Reticulation.

**WPRC-W106.64 GRAVITY SEWER AND MAINTENANCE HOLE TESTING**

All gravity sewers and maintenance holes shall be air pressure and/or vacuum tested, deflection tested (flexible pipes) and CCTV inspected in accordance with Technical Schedule SW-105 Construction of Gravity Reticulation Sewers or SW-105 Construction of Gravity Trunk Sewers as applicable.

**WPRC-W106.65 WET-WELL AND EMERGENCY STORAGE TANK TESTING**

The Contractor shall hydrostatically test the concrete SPS wet-well and emergency storage tank prior to application of coatings. Prior to testing of the concrete water retaining structure all stop gates required for that structure shall be installed. All pipework penetrations shall be in place and may be blanked off if the pipeline is not completed.
Tests shall be undertaken in accordance with AS 3735 and is not limited to the following components:

- Fill the structure to the level directed by the Superintendent, which shall be no less than the design top water level shown on the drawings;
- Check any valves/penstocks for leakage. If any leakage is noticeable, the Contractor may either undertake repair works to seal the penstock or temporarily seal the area with sand bags or the like to allow testing of the water retaining structure to continue and repair the leak following the test;
- Once the structure is full, allow the water to sit in the concrete for a period of 7 days to allow for any water take-up;
- Fix a cylindrical bucket in the tank to be tested by suspending the bucket in the structure. Fill the bucket approximately 3/4 full and set the bucket such that the water level in the bucket is slightly higher than in the structure. Fix a ruler to the inside of the bucket and record the water level in the bucket at 24 hour intervals for 7 days; and,
- At the end of the 7 day test period, provide the results to the Superintendent for approval.

The Contractor shall rectify the WUC if the leakage is either visually evident or greater than the rate described in AS 3735.

WPRC-W106.66 ELECTRICAL WORKS ACCEPTANCE TESTING

Electrical and control works shall be tested and commissioned in accordance with any Project Specification and WSA 04-2005 Section 36.9.

WPRC-W106.67 ODOUR CONTROL SYSTEM TESTING

Following commissioning of the SPS, the odour control system shall be tested in accordance with WSA 04-2005 Section 37.3.

WPRC-W106.68 CONNECTION TO EXISTING SEWERS

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working day’s notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in case where the pipes are greater than DN150 in size.

Connection to existing sewers shall comply with WSA02-2014 Clause 34 unless otherwise agreed with the Water Agency.
WPRC-W106.69 OPERATIONS AND MAINTENANCE MANUAL

The Contractor shall submit an Operation and Maintenance (O&M) Manual and shall contain instructions for handling, installation, operation, and maintenance of the WUC.

The spine and front cover of each O&M manual shall be printed and contain the Contract Number, Contract Name and type of equipment. The O&M manual shall contain identification of the supplier’s name, and, as applicable, names, addresses and phone numbers of sub-suppliers, nearest material, equipment and parts suppliers, and service organisations.

Not less than 3 weeks prior to final Commissioning, the Contractor shall supply comprehensive instruction manuals suitable for the detailed training and guidance of personnel in the installation, operation and maintenance of the equipment supplied under this Contract.

Two bound copies of each manual shall be submitted for approval and three bound final copies shall be provided.

All manuals shall be in the English language and shall be specific to the equipment being provided. The Manuals shall include, but not be limited to:

- Literature, data sheets, etc. required for operation and maintenance of the equipment.
- Data shall be functionally complete for all equipment and systems;
- Data shall include drawings, diagrams (including wiring diagrams), pictures, or actual photographs (when they add to the understanding and clarity of the text), as necessary to describe the equipment provided;
- Precautions and warnings relative to personal safety and the protection of the equipment shall be included where applicable;
- Detailed manual for each item of equipment provided under the Contract.
- Detailed manual for each type of PLC module and instrument.
- Recordings of the settings and configuration of all electronic devices - such as soft starters and instruments.
- Commercial information (brochures, catalogues, etc.) for many items of equipment shall be utilized under the following conditions;
- Details of all calibrated equipment settings and test sheets; and,
- Operating and maintenance instructions.

WPRC-W106.70 WORK AS-EXECUTED DETAILS

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked "As-Executed" with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (easting and northing) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

The location of all underground services, cables and conduits shall be accurately recorded on the approved for construction drawings during the course of the WUC.
Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As-Executed' Drawings and documentation.

**WPRC-W106.71  COMMISSIONING**

Commissioning of the WUC shall be carried out in accordance with WSA04-2005 Clause 21, any Project Specification and any instruction from the Superintendent.

The Contractor shall test and/or inspect all materials, equipment, installation and workmanship included in the WUC to prove compliance with the Specification requirements. Testing shall include pre-commissioning, field testing and performance testing of each part of the whole installation.

Tests and inspections shall comply with current relevant Australian Standards and WSA04-2005.

The Contractor shall prepare a Commissioning Plan and program and submit this to the Superintendent for approval at least 4 weeks prior to the commencement of commissioning.

Pre-commissioning is the preparation of plant or equipment so that it is in a safe and proper condition and ready for commissioning and operation. It includes all aspects of plant operation such as safety, electrical, mechanical and instrumentation.

Commissioning is the running of the plant and equipment to ensure flow through the pumping system, carrying out any necessary testing and adjustments until it is ready and suitable for normal starting and running under service conditions.

Handover is when the system is accepted by the Water Agency as fit-for-purpose and subsequently put into operation by the Water Agency. It is also when all documentation is completed and supplied to the Water Agency by the contractor, and when all system defects are closed out.

The Contractor shall prepare and use pre-commissioning and commissioning record sheets and or checklists. At the completion of each phase, these shall be signed by both the Contractor and Superintendent or nominated representative who witnessed the test/s and then be submitted to the Superintendent.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former
Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W107

CONSTRUCTION OF SEWAGE RISING MAINS
## TECHNICAL SCHEDULE WPRC-W107 – CONSTRUCTION OF SEWAGE RISING MAINS

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APPENDIX A – HYDROSTATIC TESTING FORMS ................................................. 18
GENERAL

WPWRC-W107.1 SCOPE

This Specification applies to the construction of sewage rising mains up to and including DN 375mm after being designed in accordance with the Principal’s design standards and specifications. This Specification is applicable to contracts:

a) That require construction only; with materials supplied by the Principal.

b) That require the supply of materials and construction of the Works by the Contractor.

c) That are either Schedule of Rates or Lump Sum payment contracts.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W107.2, unless specified otherwise herein.

WPWRC-W107.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1111   ISO metric hexagon commercial bolts and screws
AS 1112   ISO metric hexagon nuts
AS 1214   Hot dipped galvanised coating on threaded fasteners
AS 1237   Plain washers for metric bolts, screws and nuts for general purposes
AS 1281   Cement mortar lining of steel pipe and fittings
AS 1289   Methods of testing soils for engineering purposes
AS 1379   Specification and supply of concrete
AS 1477   PVC Pipes and fittings for pressure applications
AS 1579   Arc-welded steel pipes and fittings for water and waste-water
AS 1627   Metal finishing
AS 1646   Rubber joint rings for water supply, sewerage and drainage purposes
AS 2032   Code of Practice for installation of UPVC pipe systems
AS 2280   Ductile iron pressure pipe and fittings
AS 2566   Buried flexible pipelines
AS 2638   Cast iron sluice valves for waterworks purposes
AS 3571   Plastic piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP resin) – pressure and non-pressure drainage and sewerage
AS 3680   Polythene Slewing for Ductile Iron Pipes
AS 3681   Application of polyethylene for ductile iron piping
Testing of products for use in contact with drinking water
Metallic Flanges for Waterworks Purposes
Polyethylene (PE) pipes for pressure applications
Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
Oriented PVC (PVC-O) pipes for pressure applications
Hot dip galvanised (zinc) coatings on fabricated ferrous articles
Modified PVC (PVC-M) pipes for pressure applications
Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
Non-return valves – swing check and tilting disc
Air valves for water supply

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA01 Polyethylene Pipeline Code
WSA04 Sewage Pumping Station Code of Australia
N/A WSAA Product Specifications
WSA 114 Concrete Special Class
WSA 132 Access Covers for Water Supply and Sewerage

International Standards

ISO 10467 Plastics piping systems for pressure and non-pressure drainage and sewerage – glass reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin

WPRC-W107.3 STANDARDS

Construction of the Work Under Contract (WUC) shall be undertaken in accordance with WSA04-2005 Sewage Pumping Station Code of Australia, Part 3: Construction.
WPRC-W107.4 DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS

Materials used shall be as specified by the Drawings or Project Specification.

Delivery, transportation, handling and storage of all products and materials shall be undertaken in accordance with the manufacturer’s recommendations and clause 20.5 and 20.7 of WSA04-2005.

All pipe, fittings and associated mechanical equipment shall be suitable for the contact with untreated sewage.

WPRC-W107.5 POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be either:
- Modified PVC (PVC-M) compliant with WSAA Product Specification WSA PS-209 and manufactured in accordance with AS 4765.
- Oriented PVC (PVC-O) compliant with WSAA Product Specification WSA PS-210 and manufactured in accordance with AS 4441.
- Unplasticised PVC (PVC-U) compliant with WSAA Product Specification WSA PS-211 and manufactured in accordance with AS 1477.

All PVC pipe shall be:
- Minimum pressure class PN16.
- Series 2 compliant with external diameter compatible with ductile iron pipe.
- Coloured white or light grey for sewage.
- Rubber ring jointed.
- Used with ductile iron fittings.
- Legibly and durably marked with black letters of at least 10 mm high “SEWAGE – DO NOT DRINK” or equivalent, repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- Installed in accordance with AS 2032 and with detectable marker tape to assist with future pipe location.
- Minimum DN 100mm.

WPRC-W107.6 DUCTILE IRON PIPE AND FITTINGS

Ductile iron pipes shall be compliant with WSAA Product Specification WSA PS-200. Ductile iron fittings shall be compliant with WSAA Product Specification WSA PS-201 or WSA PS-212 and shall be provided with external and internal coating in accordance with AS 4158.

Where Ductile Iron Cement Lined (DICL) is specified on the Drawings, pipes shall be cement lined in accordance with AS 1281 (DICL) with sulphate resisting cement and seal coated. Where Ductile Iron Epoxy Lined (DIEL) is specified on the Drawings, pipes shall be internally coated in accordance with AS 4158.

Ductile iron pipes and fittings shall be:
- Manufactured in accordance with AS 2280.
Minimum pressure class PN35 (alternatively flange class may be used).
- Rubber ring or flanged jointed.
- Externally coated with a bituminous or synthetic resin coating to AS 2280.

**WPRC-W107.7 POLYETHYLENE (PE) PIPE AND FITTINGS**

PE pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:
- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN10.
- Coloured black with white stripes for sewage.
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

**WPRC-W107.8 GLASS REINFORCED PLASTIC (GRP) PIPES AND FITTINGS**

GRP pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-205S or WSA PS-237S and shall be:
- Manufactured in accordance with AS 3571 or ISO 10467.
- Minimum pressure class PN10.
- Minimum stiffness of SN10,000.
- Rubber ring jointed with approved couplings or flange jointed.
- Installed with detectable marker tape to assist with future pipe location.

Where GRP pipes are to be installed using trenchless installation methods, pipes shall be compliance with WSAA Product Specification WSA-PS205J. Pipes shall have a minimum stiffness class as required to withstand the design jacking load as calculated by the Contractor.

**WPRC-W107.9 MILD STEEL PIPES AND FITTINGS**

MSCL pipes and fittings shall be compliant with WSAA Product Specifications WSA PS-203 and WSA-204 and shall be:
- Manufactured in accordance with AS 1579.
- Externally coated with a fusion bonded medium density polyethylene coating system in accordance with AS 4321.
- Minimum wall thickness of 5mm for pipes 300mm diameter and smaller
- Minimum wall thickness of 6mm for pipes larger than 300mm and all mitre bends and pipe specials.

Where Mild Steel Cement Lined (MSCL) is specified on the Drawings, pipes shall be cement lined in accordance with AS 1281 with sulphate resisting cement and seal coated. Where Mild Steel Epoxy Lined (MSEL) is specified on the Drawings, pipes shall be internally coated in accordance with AS 4158.
**WPRC-W107.10 STOP VALVES**

Stop valves shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
- Provided with a handwheel where installed within a pit or above ground.

**WPRC-W107.11 AIR VALVES**

Air valves shall be compliance with WSAA Product Specification WSA PS-275 and shall be:

- Dual acting air valves.
- Manufactured in accordance with AS 4956.
- Suitable for use with sewage.
- Installed with an isolation valve.
- Minimum diameter DN80mm.

**WPRC-W107.12 MECHANICAL JOINTS**

Mechanical joints such as gibault joints and dismantling joints shall have a minimum pressure class of PN16 and shall comply with the WSAA Product Specification WSA PS-270 or WSA PS-271 as applicable.

**WPRC-W107.13 FLANGES**

All flanges shall be a minimum pressure class of PN16 and comply with AS 4087, unless noted otherwise on the Drawings or as necessary to match existing flanges.

**WPRC-W107.14 FASTENERS**

All bolts, nuts and washers shall be galvanised in accordance with AS 1214 or stainless steel grade 316. Hexagon bolts shall comply with AS 1111, hexagon nuts shall comply with AS 1112 and washers shall comply with AS 1237.

**WPRC-W107.15 GASKETS**

Elastomeric gaskets for rubber ring jointed pipes and flanges shall be compliant with WSAA Product Specification WSA PS-312 and AS 1646. Gaskets shall be supplied in bags and not supplied directly fitted.
to the ends of pipes. Gaskets shall be stored in accordance with the manufacturer’s recommendations in bags with protection from UV radiation and shall be suitable for outdoor storage for up to 2 years.

**WPRC-W107.16 METALWORK**

Structural steelwork, ladders, brackets, covers and other metalwork shall be blast cleaned for AS 1627 Class 3 and hot dip galvanised to AS 4680, AS 4791 or AS 4792 as applicable where not in contact with sewage. Where located in contact with sewage metalwork shall be stainless steel grade 316.

**WPRC-W107.17 CONCRETE**

Concrete shall be compliant with WSAA Product Specification WSA PS-357 for normal class and shall comply with AS 1379. Where Special Class concrete is specified, this shall be compliant with WSAA Product Specification WSA PS-358 and WSA 114.

**WPRC-W107.18 TRENCH FILL MATERIAL**

Trench fill in trafficable areas 20mm crushed rock in accordance with Roads and Maritime Services (RMS) standard specifications for DGS20.

Trench fill in non-trafficable areas may be select excavated or imported material and shall be free of vegetation, organic matter, debris, and rocks with a dimension not greater than 75mm in any direction. Select material shall be capable of compaction, without excessive effort, to a mean value of density ratio ($R_d$) of not less than 95%.

**WPRC-W107.19 EMBEDMENT MATERIAL**

Fine crushed rock embedment shall be compliant with WSAA Product Specification WSA PS-359.

Compaction sand embedment shall be Grade A and be compliant with WSAA Product Specification WSA PS-350.
WPRC-W107.20 MAINTENANCE HOLES

All maintenance holes shall be cast in-situ unless specified as pre-cast being permitted on the Drawings. Where pre-cast concrete maintenance holes are permitted they shall be compliant with WSAA Product Specification WSA PS-323 and shall be:

- Manufactured in accordance with AS 4198.
- Cement type SR with minimum cement content of 450 kg/m³.
- Concrete characteristic strength of 50 MPa.
- Aggregate durability exposure condition C as per AS 2758 clause 9.
- Provided with minimum cover to reinforcement of 40 mm internally and 25 mm externally, except at joint ends where a minimum cover of 20 mm shall be provided.
- Provided with 2 lifting inserts on each component, each having a safe-lift rating of at least 1 tonne.
- Either EPDM elastomeric joint sealed in accordance with AS 1646, AS 681 or butyl rubber joint sealed in accordance with ASTM C990M-09.

WPRC-W107.21 LOCATION

The location, sizes, pressure class and other details of the pipelines are shown on the Drawings. The location of appurtenances such as valves, scours and air valves are also shown on the Drawings. The pipelines and appurtenances shall be constructed to the locations shown on the Drawings unless directed otherwise by the Superintendent.

WPRC-W107.22 COVER OVER PIPES

The minimum depth of cover over pipes, measured vertically from the finished surface level to the top of any pipe, flange or socket shall be as follows:

- 450mm in non-trafficable locations in residential areas (e.g. nature strips).
- 600mm in non-trafficable locations in industrial areas (e.g. nature strips).
- 600mm under sealed roadways and footpaths.
- 750mm under major roadways or embankments.

The maximum cover for sewage rising mains shall be 1500mm unless otherwise approved by the Superintendent.

WPRC-W107.23 CROSSINGS

Where a pipeline crosses a main road, creek or involves features under the control of any Authority, the affected work shall be carried out in accordance with the requirements of that Authority. It shall be the Contractor’s responsibility to complete written notification to the Authority of the intention to carry out the work.

WPRC-W107.24 EXCAVATION

All excavations for structures and pipes shall be to the lines, grades and forms shown on the Drawings or directed by the Superintendent within the specified tolerances. Excavation shall be undertaken in
according with Clause 28 of WSA04-2005. Minimum trench width for pipes shall be in accordance with the Drawings and AS 2566. Where a trench is excavated across a paved surface, the trench width shall be kept to a minimum and bitumen and concrete surfaces saw cut in a neat straight line.

Spoil shall not be placed within 1,000mm from the zone of influence at the edge of any excavation. Excavated materials shall not be placed against the walls of any building or fence without the written permission of the owner of such building or fence. Topsoil from excavations shall be kept separate and utilised to make good the surface after backfilling.

The Contractor shall adequately support all excavations as the works proceed. When withdrawing supports, the Contractor shall exercise every precaution against slips or falls by means of intermediate shoring, planking or props. Backfilling shall be performed simultaneously with the withdrawal of supports.

At the completion of each work day, excavations should be preferably filled. Any excavations left open shall be suitably secured and left safe for the public and others in the vicinity of the Site. As a minimum open excavations shall be secured with security fencing or steel road plates.

The Contractor shall undertake erosion and sediment control at the Site in accordance with WS-101 General Construction.

**WPRC-W107.25  ROCK EXCAVATION**

Unless noted otherwise, the Contract Sum is deemed to include excavation in any material including excavation in rock. Any delay due to the presence of rock shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay.

**Definition of Rock**

Where rock excavation is stated to not be included in the Contract Sum, rock shall be defined as solid bedrock material than can only be efficiently excavated using a rock hammer attached to an excavator as determined by the Superintendent. Boulders and rippable material are not deemed to be considered rock and deemed to be included in the Contract Sum.

Measurement for payment of rock excavation where provided for in the Contract shall be measured based on the minimum trench width required. If the Contractor believes it has encountered rock, the Contractor shall notify the Superintendent within 4 hours. The Superintendent shall then inspect the material and determine whether the material is considered to be rock.

**WPRC-W107.26  BEDDING FOR PIPES**

The trench floor shall be prepared and pipe bedding and support placed in accordance with Clause 29 of WSA03-2005.

**WPRC-W107.27  LAYING OF PIPES**

Laying of pipes shall be undertaken in accordance with Clause 30 of WSA04-2005.
Before being laid, all pipes, fittings, valves and other appurtenances shall be cleaned and examined by the Contractor. The Contractor shall ensure that the interior of the pipeline is clean and free from obstructions. Approved exclusion caps or plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

Detectable marker tape shall be laid on top of the pipe embedment for all non-metallic pipes, except for trenchless installations where tracer wire shall be used instead.

Pipes shall be cut as needed or directed by the Superintendent to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting. For field cuts of DICL pipes, the Contractor shall only use an approved mechanical pipe cutter. The Contractor shall ensure that fire fighting equipment, in working order, is on the site prior to the field cuts being made. If the Contractor proposes to use a petrol engined pipe cutter in an excavation the Contractor shall ensure that a safe atmosphere is maintained for workers in the excavation at all times. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer’s written instructions, or as directed by the Superintendent.

**WPRC-W107.28  TRENCH STOPS**

Trench stops shall be constructed on all pipes with a grade steeper than 5% (i.e. 1 in 20). Spacings of trench stops shall be calculated using the following formula:

\[
\text{Trenchstop spacing (m) = \frac{100}{\text{Grade} (\%)}
\]

**WPRC-W107.29  BULKHEADS**

Concrete bulkheads shall be constructed on all pipes with a grade steeper than 15%.

For pipe grades between 15% and 29%, spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m) = \frac{L}{\text{Grade} (\%)} \text{ where } L = 80 \times \text{pipe length (m)} (450m \text{ max})}
\]

Where \( L > 100m \) also construct intermediate trench stops at spacing < 100/grade (%)

For pipe grades between 30% and 50% spacings of bulkheads shall be calculated using the following formula:

\[
\text{Bulkhead spacing (m) = \frac{100}{\text{Grade} (\%)}
\]

**WPRC-W107.30  WRAPPING**

All buried fasteners (bolts, nuts, washers), mechanical joints, tapping bands and flanges shall be protected for corrosion and using an approved protective system. Protection shall include a primer, mastic and tape with an overwrap applied in accordance with the manufacturer’s instructions.
Where specified on the Drawings, the Contractor shall construct valve chambers of the type shown on the Drawings.

Covers shall be finished flush with the surface in roadways, footpaths and paved surfaces. Elsewhere, covers shall be finished 25 mm above the surface of the ground, or such other level as directed by the Superintendent, in a manner designed to avoid as far as possible, soil being deposited over the cover.

Maintenance holes shall be constructed in accordance with WSA 04-2005 Clause 31.

The Contractor shall coat the internal surface of the rising main discharge maintenance hole and any other maintenance holes specified on the Drawings, with an approved epoxy.

Thrust and anchor blocks shall be constructed at valves, flexible jointed bends/tees/tapers and ends of PE pipelines as shown on the Drawings and detailed in WSA04-2005 clause 30.5.

Restrained pipe systems may be used in place of thrust and anchor blocks where shown on the Drawings or as otherwise approved by the Superintendent.

The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test. The cost of providing such anchorages shall be deemed to be included in the rates tendered for laying and jointing pipelines.

Concrete encasement shall be undertaken in accordance with WSA04-2005 Clause 32.6.

Where pipes have less than 450mm of cover above the top of the pipe barrel and also where approved by the Superintendent, they shall be encased in concrete. Concrete shall be minimum grade N20 and shall be for the full width of the excavated trench and be a minimum of 150mm above and below the pipe barrel. For trenches in rock, the depth of the concrete encasement may be reduced to 100mm below the pipe barrel.

In trenches of other than rock or fissured rock, a contraction joint consisting of a layer of bituminous felt 12 mm thick shall be formed in the concrete encasement at the face of each socket or at one face of each coupling.

Reinforcement in concrete encasement shall be as shown on the Drawings.
**WPRC-W107.35  TRENCH FILL**

Trench fill shall be undertaken in accordance with WSA04-2005 Clause 33.

Trench fill in trafficable areas 20mm crushed rock as per Clause SW-107.18. Trench fill material shall be placed and compacted in layers not exceeding 200mm loose thickness, and shall be moisture conditioned as required to facilitate compaction to the required density. The minimum dry density ratio (AS 1289.5.4.1) as measured using the Modified Compaction test (AS1289.5.2.1) for trafficable areas shall be 95% except for the top 100mm under existing roads which shall be 98%. In the event that the road owner has trench fill requirements which exceed the above, the road owner’s requirement shall take precedence and apply.

Trench fill in non-trafficable areas may be select excavated or imported material complying with Clause SW-107.18. The Contractor shall establish the optimum loose layer thickness to achieve the required compaction, however this shall not exceed 300mm. The minimum dry density ratio of non-trafficable trench fill shall be 90% except for the top 600mm of the trench which shall be 95%. Where the works are located in areas with cohesionless soils (e.g. sand or silty sands) and using cohesionless trench fill then trench fill in non-trafficable areas shall achieve a Density Index (AS 1289.5.6.1)relative density of 60% or PSP /DCP penetration resistance of 7 blows per 300mm.

**WPRC-W107.36  BORED PIPES UNDER ROADS, DRIVEWAYS AND ELSEWHERE**

Trenchless construction of pipes shall be undertaken in accordance with WSA04-2005 Clause 30.8.

The installation of rubber ring jointed pipes (which are not specifically designed for trenchless technology applications) within unsleeved boreholes may only be undertaken if shown on the design Drawings and the following requirements are met:

- No more than 2 joints are contained in the borehole.
- The pipe has sufficiently strong sockets and sufficient stiffness (PVC-O is not acceptable).
- The borehole has structural integrity and retains a clean and clear borehole surface free from significant debris.
- The use of spacers is required for DICL to prevent the outer coating from being damaged.
- Mechanical equipment may not be used to push the pipe through the borehole.
- Exclusion caps are used to keep the inside of the pipe clean as it is pushed through the borehole.

Where the annular void for the borehole exceeds 50mm, then this shall be grouted with an approved grout mix.

**WPRC-W107.37  MARKERS**

Opposite each stop valve, scour valve and air valve the Contractor shall fix a marking plate in a manner and position as shown on the Drawings or otherwise approved by the Superintendent.

Where the appurtenance is more than a 3m distance from any existing wall, fence, kerb face, or post, the Contractor shall fix the relevant marking plate with four galvanised screws or clout nails at the top of a post, facing the valve or hydrant.
The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.

Marking plates shall be fixed as soon as practicable after each valve or hydrant is installed. However, marking plates for hydrants shall be temporarily covered using masking tape or other approved cover which shall be removed by the Contractor on satisfactory completion of the pressure testing of the pipeline.

In addition to the marking plates, two-way reflective raised pavement markers, blue in colour, are to be affixed to the road pavement with an approved epoxy adhesive directly opposite the location of all hydrants on the centreline of the roadway.

**WPRC-W107.38 COMPACtion TESTING**

Compaction testing shall be carried out in accordance with WSA04-2005 Clause 36.3 unless required otherwise by the road owner or modified otherwise by the Superintendent.

**WPRC-W107.39 HYDROSTATIC PRESSURE TESTING**

All pipelines greater than 20m in length shall be hydrostatically pressure tested after concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA04-2005 Clause 36.5.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.

Hydrostatic pressure testing shall be conducted in accordance with the following methods:

<table>
<thead>
<tr>
<th>Pipeline Type</th>
<th>Test Method</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC, DICL, MSCL</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>4 hours</td>
</tr>
<tr>
<td>PE</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &gt;5% PE by length</td>
<td>WSA01-2004 Clause 2.13.</td>
<td>5 hours</td>
</tr>
<tr>
<td>Mixed with &lt;5% PE by length</td>
<td>AS 2566.2 M4 Constant Pressure (Water Loss)</td>
<td>4 hours</td>
</tr>
</tbody>
</table>
The test pressure shall be as shown on the Drawings and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory is all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

**WPCC-W107.40 CONNECTION TO EXISTING SEWERS**

The Principal shall determine whether connections to existing live sewers may be undertaken by the Contractor or undertaken by the Principal. This determination will take into account the work involved in making the connection, impact on customers and impact on operation of the live water asset.

For connection works to be undertaken by the Principal, the Principal will not schedule the work until pre-payment of the full quoted cost has been made. Once payment has been made, the Principal will undertake the connection work. The Principal shall be given ten (10) clear working days’ notice, after payment of the quoted charge, of such connections being requested by the Contractor. The Principal may require longer notice in case where the pipes are greater than DN150 in size.

**WPCC-W107.41 RESTORATION**

Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Restoration shall be undertaken in accordance with WSA04-2005 Clause 35 which outlines the requirements for pavements, lawns, grassed areas and bushland.

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the Defects Liability Period applicable to those surfaces, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance may or may not be due to defects which become apparent or arise from events which occur during the Defects Liability Period.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.

In locations where, in the opinion of the Superintendent, surplus material left in the vicinity of the trench would not be objectionable, the surplus material may be disposed by spreading neatly in the
vicinity of the trench to the satisfaction of the Superintendent in such a way as to minimise future erosion of the backfill and adjacent ground surfaces.

Any subsequent settlement of trench fill material after construction shall be made good by the Contractor, as required, by placing additional fill.

Should the Contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be so carried out as to restore full support to those surfaces, and payment shall be made for the restoration of the surfaces as though they had been removed and replaced. The Contractor shall remain responsible for the repair of the improved surfaces, if subsequently damaged due to subsidence of the backfill, until the end of the Defects Liability Period.

**WPRC-W107.42 WORK AS-EXECUTED DETAILS**

The Contractor shall prepare a set of Work As-Executed Drawings that contain a similar level of detail to the Design Drawings. The Drawings should be clearly marked “As-Executed” with the relevant date and revision number. The Work As-Executed Drawings are required to show the all as-built information including coordinates (eastings and northings) of connection points, changes of direction or gradient, invert levels etc., even though the design drawings may not, in all instances, contain this information.

Work As-Executed Drawings shall be submitted by the Contractor to the Superintendent in both PDF and Autocad DWG format. Drawings shall be prepared to the Map Grid of Australia (MGA) coordinate system.

If, during the Defects Liability Period, the Contractor modifies any of the Works, the modifications shall be included in amendments to the 'As Constructed' Drawings and documentation.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR  .................................................................

CONTRACT  .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
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</tbody>
</table>

Contractor .................................................................................................................................... (Signature)  
..............................................................................................................................Date

Received by - Superintendent ............................................................................................. (Signature)  
..............................................................................................................................(Date)

- Principal .................................................................................................................. (Signature)  
..............................................................................................................................(Date)
### Hydrostatic Testing Results – Constant Pressure (Water Loss) Method M4 AS 2566.2

<table>
<thead>
<tr>
<th>Section</th>
<th>Required Test Pressure</th>
<th>Actual Test Pressure</th>
<th>Test Start Time</th>
<th>Test Finish Time</th>
<th>Permitted Make-Up Water</th>
<th>Actual Make-Up Water</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
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</tbody>
</table>

Permitted make up water is determined by the formula \( Q \) (L/h) = 0.14LDH where \( L \) = pipeline length (km), \( D \) = pipeline diameter (m) and \( H \) = average test head over pipeline (m).

Witnessed by Superintendent ................................................................. (Signature)

.................................................................Date

Contractor ................................................................................................ (Signature)

.................................................................Date

CONTRACTOR ........................................................................................................

CONTRACT ........................................................................................................

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION ........................................................................................................

TEST DATE ........................................................................................................

WATER TEMPERATURE ....................................................................................

TEST START TIME ...........................................................................................

TEST FINISH TIME ..........................................................................................

TEST PRESSURE ..............................................................................................

<table>
<thead>
<tr>
<th>Section</th>
<th>1 hour</th>
<th>2 hours</th>
<th>3 hours</th>
<th>4 hours</th>
<th>5 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make-up water added L (ΔV)</td>
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</tr>
</tbody>
</table>

Permitted make-up water is determined by the formula \( V_{\text{all}} \) (L/h) = 0.14LDH where \( L \) = pipeline length (km), \( D \) = pipeline diameter (m) and \( H \) = average test head over pipeline (m).

ALLOWABLE MAKE-UP \( (V_{\text{all}}) \) ..................................................

\( 0.55 \times ΔV_{(3h-2h)} \) at 3rd hour + ALLOWABLE MAKE-UP \( (V_{\text{all}}) \) ........................................

\( ΔV \) (5th-4h) at 5th hour ........................................................................

PASS/FAIL ..............................................................................................

Witnessed by Superintendent ........................................................................................................ (Signature)

...............................................................................................................Date

Contractor ........................................................................................................ (Signature)

...............................................................................................................Date
WPRC-W301 SEWER MAINTENANCE – GENERAL

TECHNICAL SCHEDULE

WPRC-W301

SEWER MAINTENANCE - GENERAL
## TECHNICAL SCHEDULE WPRC-W301 – SEWER MAINTENANCE - GENERAL

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<td></td>
</tr>
</tbody>
</table>
WPRC-W301: SEWER MAINTENANCE - GENERAL

WPRC-W301.1 SCOPE

This Specification applies to undertaking work within the Principal’s existing sewerage system for the purposes or carrying out operations, maintenance and construction activities such as inspection, rehabilitation or cleaning.

The requirements for performing the specific operation, maintenance or construction activity are set out in the relevant Technical Schedule for the activity. This Technical Schedule should be used in conjunction with the activity Technical Schedule.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W301.2, unless specified otherwise herein.

WPRC-W301.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a Project Specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or Project Specific Specification shall apply.

Australian Standards

AS 1742 Manual of uniform traffic control devices
AS 2865 Confined Spaces

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA02 Sewerage Code of Australia

WPRC-W301.3 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

WPRC-W301.4 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor’s employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.
Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

WPRC-W301.5 TRAFFIC

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.
The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for *Traffic Control at Work Sites*, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

**WPRC-W301.6 PROTECTION OF THE ENVIRONMENT**

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

**WPRC-W301.7 NOISE**

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

**WPRC-W301.8 CUSTOMER NOTIFICATION**

If entry to private property is required then the Contractor is to advise the property owner a minimum of two (2) clear working days in advance of the work proceeding. This advice is to be in the form of a signed letter which the Principal will supply in this regard. The Contractor shall be responsible for duplication and all associated costs. In addition to this written advice, the Contractor shall also verbally advise the resident on the day that the work is programmed and the work is about to commence. If there is not a resident in attendance at the time the Contractor’s personnel have arrived on site, then the Contractor shall proceed with the work provided that the letter of notification had been previously sent the required timeframe in advance of entry to the property.
On completion of work the Contractor shall leave a Calling Card in the letterbox of the property. The Principal shall provide to the Contractor the necessary cards. The Contractor is responsible for all duplication and associated costs.

The Contractor shall not, without prior approval of the Superintendent, enter private property outside the hours of 8.00am to 5.00pm Monday to Friday or at any time on Public Holidays.

**WPRC -W301.9 CUSTOMER COMPLAINTS**

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor’s cost.

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

**WPRC -W301.10 DAMAGE TO PROPERTY**

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by his operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

**WPRC -W301.11 DEALING WITH DOGS**

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.
Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.

Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal’s Animal and Ranger Services to assist.

**WPRC -W301.12 ENTRY TO MAINTENANCE HOLES**

The Contractor when entering or working in maintenance holes or other confined spaces associated with the carrying out of this work shall comply with AS 2865 Safe Working in a Confined Space, and any other statutory requirements of the State and / or Commonwealth.

Only personnel who have been trained in procedures for working in confined spaces in accordance with AS 2865 are permitted to enter confined spaces. The Contractor shall provide documentary evidence of such training before commencing work on site.

**WPRC -W301.13 LOCATION OF MAINTENANCE HOLES**

Maintenance hole locations will be shown on the plans supplied by the Principal.

Contractors should be aware that maintenance holes on the Principal’s sewerage network can be located in backyards of private properties and may not be readily accessible. It can therefore be expected that access will be restricted for equipment, excavation plant and equipment and that there may be extensive reinstatement requirements.

Some maintenance holes will be located in busy roads and intersections where traffic management may be required. Where required for situations such as this, the Contractor will provide all attended or complex traffic management.

The Contractor shall include for all site conditions and reinstatement requirements.

The Contractor shall use appropriate maintenance hole cover lifting devices designed to reduce the risk of damage to the maintenance hole and injury to the operator. Any maintenance hole lids or surrounds damaged by the Contractor are to be replaced by the Contractor at the Contractor’s cost.
The Contractor must make a reasonable effort to locate maintenance holes including searching for a minimum of 15 minutes using a metal detector, probe and shovel. If the maintenance hole cannot be accessed due to being buried or built over, the Contractor shall notify the Superintendent in writing explaining why the maintenance hole was not accessed (including provision of a digital photograph of the site).

In the event that a maintenance hole cover is found to be buried greater than 150mm below the surface, the Contractor shall notify the Superintendent. The Superintendent shall then review the need to modify the maintenance hole and raise the cover level considering the location and nature of the site, and shall confirm the required actions for the Contractor and/or the Principal.

At completion of work at each site, the Contractor shall grease all maintenance hole covers that have been opened to carry out the Works.

**WPRC-W301.14 LOSS OF EQUIPMENT AND MATERIALS INTO SEWER**

The Superintendent shall be notified immediately on loss of equipment or materials into the sewer. The Contractor must not attempt to recover the equipment or continue inspections without receiving confirmation to do so by the Superintendent. The Contractor shall clearly identify the nature of equipment and materials that have been lost and identify the possible damage that they may cause to the sewerage system.

The Contractor shall be responsible for removal of any trapped equipment and shall wear all risks and bear all costs associated with the removal of the equipment. The Contractor is permitted to use his own or subcontracted resources for excavation and breaking into the sewer conduit to retrieve equipment. Any sewer conduit damaged by this operation is to be reinstated to the satisfaction of the Superintendent and must be inspected by the Superintendent’s representative prior to being backfilled. The Contractor shall restore all surfaces to the satisfaction of the Superintendent.

**WPRC-W301.15 EXCAVATION**

Should excavation be necessary for any reason, it is to be carried out in accordance with Principal’s standard specifications. Particular attention is drawn to the following requirements outlined in this Clause.

Prior to the commencement of any excavation, the Contractor is to determine the location of any services in the vicinity of the proposed excavation. The Contractor shall take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service. If the Contractor damages a service the Contractor is to immediately contact the relevant authority or owner and arrange repairs to the satisfaction of the authority or owner. The Contractor is to obtain from the authority or owner a certificate stating that the repair has been carried out to their satisfaction. If the owner of the service cannot be determined the Contractor is seek further advice from the Superintendent. All costs associated with the location and repair of services are to be borne by the Contractor.
The Contractor is not to commence any excavation until all materials necessary to make the excavation safe are on site and available for use. This includes any necessary fencing and barriers as well as trench support systems.

Excavation is to be kept to the minimum possible to allow efficient execution of the works.

If excavation of bitumen, asphalt or concrete surfaces is involved the Contractor is to saw cut neat straight lines at the outer limits of the excavation. Any affected pavers, blocks or brick pavements shall be removed by hand, cleaned and set aside for later replacement.

The Contractor is to adequately support all excavations as the work proceeds to meet the requirements of the Workcover Authority.

The Contractor is to promptly remove and dispose of excavated material which is not required for reuse. The material is to be disposed of at an approved tipping site.

The Contractor is to backfill in accordance with Principal’s standard specifications.

**WPRC -W301.16  RESTORATION**

The Contractor shall replace all manhole lids and inspection shaft lids at the earliest opportunity after completion of work. The lids of all maintenance holes accessed by the Contractor shall be greased upon being replaced/closed.

The Contractor shall restore all public and private property to a condition equal to that before work on site began. Restoration where possible should be carried out prior to leaving the site.

All restoration works shall be completed within two (2) weeks of the completion of works.

Surplus material shall be removed and disposed of to areas arranged by the Contractor. Any tipping or disposal fees shall be paid by the Contractor, and are deemed to be included in the Contract Sum.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W202

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SW-202: INTERNAL CLEANING OF WATER MAINS

WPRC-W202.1 SCOPE

This Specification applies to the internal cleaning of water mains to remove scale or for water quality purposes.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W202.2, unless specified otherwise herein.

WPRC-W202.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply unless noted otherwise. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

WESTERN PLAINS REGIONAL

WPRC-W204 Water Hydrant Flushing and Dead End Flushing

Australian Standards

AS 1742 Manual of uniform traffic control devices
AS 2865 Confined Spaces

Works shall also comply with the current versions all relevant Australian Standards.

Water Services Association of Australia Standards

WSA03 Water Supply Code of Australia
WSA05 Conduit Inspection and Reporting Code of Australia

WPRC-W202.3 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

WPRC-W202.4 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.
Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.
WPRC -W202.5    TRAFFIC

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for Traffic Control at Work Sites, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

WPRC -W202.6    PROTECTION OF THE ENVIRONMENT

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

WPRC -W202.7    NOISE

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.
WPRC -W202.8        CUSTOMER NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper (and electronic media?) indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

WPRC -W202.9        ENTRY TO PRIVATE PROPERTY

If entry to private property is required then the Contractor is to advise the property owner a minimum of two (2) clear working days in advance of the work proceeding. This advice is to be in the form of a signed letter which the Principal will supply in this regard. The Contractor shall be responsible for duplication and all associated costs. In addition to this written advice, the Contractor shall also verbally advise the resident on the day that the work is programmed and the work is about to commence. If there is not a resident in attendance at the time the Contractor’s personnel have arrived on site, then the Contractor shall proceed with the work provided that the letter of notification had been previously sent the required timeframe in advance of entry to the property.

On completion of work the Contractor shall leave a Calling Card in the letterbox of the property. The Principal shall provide to the Contractor the necessary cards. The Contractor is responsible for all duplication and associated costs.

The Contractor shall not, without prior approval of the Superintendent, enter private property outside the hours of 8.00am to 5.00pm Monday to Friday or at any time on Public Holidays.

WPRC -W202.10        NOTIFICATION OF EMERGENCY SERVICES

At least two (2) days prior to the commencement of work the Contractor shall advise the local Fire Brigade of the proposed cleaning program.
CUSTOMER COMPLAINTS

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor’s cost.

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

DAMAGE TO PROPERTY

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

DEALING WITH DOGS

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.

Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.

INTERNAL CLEANING OF WATER MAINS
Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal’s Animal and Ranger Services to assist.

**WPRC -W202.14   LOCATION OF WATER MAINS**

Recorded water main and surface fitting locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the locating the water main and surface fittings on site.

If work cannot be undertaken by the Contractor due to failure to locate a surface fitting after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal’s staff. If the Principal’s staff locate the fitting within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

**WPRC -W202.15   WATER SUPPLY**

Water is available for the purposes of this contract from Principal hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.

**WPRC -W202.16   ISOLATION OF WATER MAINS**

The Principal shall operate valves to isolate the subject water main prior to the cleaning operation and shall operate valves to recharge the subject water main at the completion of the cleaning operation.

Any single incidence of water supply interruption under this contract is not to exceed six (6) hours, and is not to occur outside the hours of 9.00AM to 3.00PM Monday to Friday.
WPRC-W202.17  SUBMISSION OF CLEANING PLAN

Prior to the commencement of cleaning works, the Contractor shall submit a Cleaning Plan to the Superintendent for approval. The Cleaning Plan shall detail the section of main to be cleaned, isolation points, method of access to the main, method of cleaning, application insertion/extraction points, water disposal point and any other relevant information.

WPRC-W202.18  ACCESS TO WATER MAINS

Where suitable for the Contractor’s cleaning method, the preferred access to the water main for cleaning is using selected hydrants and any other existing fixture on the water main.

Where removal of a section of pipe is required to access the water main, after isolation of the water main, the Contractor shall remove a section of pipe at one or both ends of the length of water main to be cleaned. The Contractor shall make neat, perpendicular cuts in the water main for removal and the length of pipe removed shall be the minimum required to efficiently carry out the work.

The Contractor shall ensure that silt, debris, runoff, etc. is prevented from entering water mains.

At the completion of cleaning the Contractor shall reinstate the water main in accordance with the Principal’s standard specifications and practices to the satisfaction of the Superintendent.

WPRC-W202.19  FLUSHING

Flushing of pipelines shall be carried out in accordance with WPRC-W204 Water Hydrant Flushing and Dead End Flushing.

WPRC-W202.20  SWABBING

Swabbing of pipelines using foam swabs shall be in accordance with WSA03-2011 Clause 18 unless otherwise approved by the Superintendent. Alternative methods of swabbing may be used subject to approval by the Superintendent.

WPRC-W202.21  WATER JETTING

Water jetting from mobile pressurised water jet equipment can be used to restore the internal wall of the pipe to as smooth a state as is practical without causing structural damage to the pipe.

Equipment and methods that will not cause any damage to the pipes are to be used.
WPRC -W202.22 OTHER CLEANING METHODS

Other cleaning methods may be used subject to approval by the Superintendent. Any proposed cleaning method shall not cause any damage to the internal surface of the existing water mains and must be effective in removing sediment, debris and any other particular build-up such as scale that may be required in the location proposed.

WPRC -W202.23 EQUIPMENT STUCK IN CONDUITS

If any of the Contractor's equipment becomes stuck in a conduit such that it cannot be removed without excavation, the Contractor is to notify the Superintendent immediately upon becoming aware of the problem.

The Contractor must not attempt to recover the equipment or continue inspections without receiving confirmation to do so by the Superintendent. The Contractor shall clearly identify the nature of equipment and materials that have been lost and identify the possible damage that they may cause to the water supply system.

The Contractor shall be responsible for removal of any trapped equipment and shall wear all risks and bear all costs associated with the removal of the equipment. The Contractor is permitted to use its own or subcontracted resources for excavation and breaking into the water main to retrieve equipment. Any water main damaged by this operation is to be reinstated to the satisfaction of the Superintendent and must be inspected by the Superintendent's representative prior to being backfilled. The Contractor shall restore all surfaces to the satisfaction of the Superintendent.

WPRC -W202.24 EXCAVATION

Should excavation be necessary for any reason, it is to be carried out in accordance with Principal’s standard specifications. Particular attention is drawn to the following requirements outlined in this Clause.

Prior to the commencement of any excavation, the Contractor is to determine the location of any services in the vicinity of the proposed excavation. The Contractor shall take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service. If the Contractor damages a service the Contractor is to immediately contact the relevant authority or owner and arrange repairs to the satisfaction of the authority or owner. The Contractor is to obtain from the authority or owner a certificate stating that the repair has been carried out to their satisfaction. If the owner of the service cannot be determined the Contractor is seek further advice from the Superintendent. All costs associated with the location and repair of services are to be borne by the Contractor.

The Contractor is not to commence any excavation until all materials necessary to make the excavation safe are on site and available for use. This includes any necessary fencing and barriers as well as trench support systems.
Excavation is to be kept to the minimum possible to allow efficient execution of the works.

If excavation of bitumen, asphalt or concrete surfaces is involved the Contractor is to saw cut neat straight lines at the outer limits of the excavation. Any affected pavers, blocks or brick pavements shall be removed by hand, cleaned and set aside for later replacement.

The Contractor is to adequately support all excavations as the work proceeds to meet the requirements of the Workcover Authority.

The Contractor is to promptly remove and dispose of excavated material which is not required for reuse. The material is to be disposed of at an approved tipping site.

The Contractor is to backfill in accordance with Principal’s standard specifications.

**WPRC -W202.25 DISPOSAL OF WASTE WATER AND MATERIAL**

The Contractor is to promptly remove and dispose at a Principal approved tipping site;

- All waste water and material from the cleaning; and
- Any excavated material which is not required for reuse.

The Contractor is to bear all costs associated with waste disposal.

**WPRC -W202.26 REPORTING**

The Contractor shall submit a Cleaning Report to the Superintendent prior to Practical Completion or prior to any progress payment claim. The Cleaning Report shall detail each water main section for which cleaning has been completed, method of cleaning, date of cleaning and any other details requested by the Superintendent.

Where required by the Scope of Works, the Contractor shall carry out a CCTV inspection of the internal surface of the water main following cleaning. CCTV inspections shall be undertaken in accordance with WSA05 and all equipment used shall be suitable for use in drinking water systems (i.e. not previously used within sewer systems and suitably disinfected prior to use). CCTV shall be submitted to the Superintendent in Wincan format with video in MPEG format and report in PDF format.

**WPRC -W202.27 RESTORATION**

The Contractor shall reinstate water mains to full service immediately after the conclusion of cleaning activities for each water main.

The Contractor shall restore all public and private property to a condition equal to that before work on site began. Restoration where possible should be carried out prior to leaving the site.
All restoration works shall be completed within two (2) weeks of the completion of works.

Restoration of pavements is to be in accordance with the appropriate Principal’s standard specification to suit original material.

**WPRC - W202.28 MEASUREMENT AND PAYMENT**

The rates tendered in the Contract shall be deemed to be inclusive of all responsibilities and obligations of the Contractor under the Contract including accommodation, travel, site establishment, waste disposal, and reporting in accordance with this Specification.

Measurement for payment shall be based on the length of water main cleaned.

The Contractor shall allow in the rate for as many passes up and down the conduit as required to satisfactorily clean the line. Multiple passes will not be paid as an extra or classed as additional meters for payment.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W203

WATER HYDRANT MAINTENANCE
## TECHNICAL SCHEDULE WPRC-W203 – WATER HYDRANT MAINTENANCE

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DCC-W203: WATER HYDRANT MAINTENANCE

WPRC -W203.1 SCOPE

This Specification applies to the routine maintenance of hydrants and their surrounds.

The work required to be performed under this contract shall also comply with the referenced documents in Clause DCC-W203.2, unless specified otherwise herein.

WPRC -W203.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply unless noted otherwise. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

WESTERN PLAINS REGIONAL COUNCIL

WPRC-W204 Water Hydrant Flushing and Dead End Flushing
Drawing STD 5320 Hydrant Location Markers for Urban Roads

Australian Standards

AS1851-2012 Routine service of fire protection systems and equipment
AS 3952-2002 Water supply—Spring hydrant valve for waterworks purposes
AS 4158-2003 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes

Works shall also comply with the current versions all relevant Australian Standards.

Water Services Association of Australia Standards

WSA03 Water Supply Code of Australia
WSA 17—2014 Standpipe and Hydrant Metering Code of Practice
WSA PS-267 Compliant spring hydrants

WPRC -W203.3 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.
All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

The Contractor's Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.
Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC -W203.5 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for *Traffic Control at Work Sites*, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

**WPRC -W203.6 PROTECTION OF THE ENVIRONMENT**

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

**WPRC -W203.7 NOISE**

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.
WPRC -W203.8  CUSTOMER NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper (and electronic media?) indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

WPRC -W203.9  LOCATION OF HYDRANTS

Hydrant valve locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the location of hydrants.

If work cannot be undertaken by the Contractor due to failure to locate a surface fitting after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal’s staff. If the Principal’s staff locate the fitting within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

WPRC -W203.10  WATER SUPPLY

Water is available for the purposes of this contract from Principal hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.
WPRC -W203.11  ISOLATION OF WATER MAINS

The Principal shall operate valves to isolate the subject water main prior to the cleaning operation and shall operate valves to recharge the subject water main at the completion of the cleaning operation.

Any single incidence of water supply interruption under this contract is not to exceed six (6) hours, and is not to occur outside the hours of 9.00AM to 3.00PM Monday to Friday.

WPRC -W203.12  HYDRANT INSPECTION & MAINTENANCE

Inspection
The contractor shall measure and record the following:
- The general condition of the hydrant fitting, cover and surrounds.
- The distance between the top the hydrant and the underside of the surface cover. (Hydrants should have been installed so that this distance should be between 100mm and 200mm.)
- The height of the hydrant cover in relation to the surrounding surface.
- Leaking hydrants. These must reported to the Superintendent within 2 days.

Cleaning
The hydrant cover/box is to be cleaned of all debris.

Flushing of Hydrants
Flushing of hydrants is to be carried out generally in accordance with the procedures in WPRC-W204 Water Hydrant Flushing and Dead End Flushing however the amount of water required to flush the hydrant is to be the minimum amount required to demonstrate that the hydrant is operational.

Markers
The Contractor shall fix a marking plate opposite each hydrant in a manner and position as shown on Standard Drawing STD 5320 or otherwise approved by the Superintendent.

Where there is no kerb face, the Contractor shall fix the relevant marking plate with approved adhesive at the top of a post or on an existing wall or fence facing the hydrant or otherwise approved by the Superintendent.

Posts
The Contractor shall install posts at right angles to the main facing towards the hydrant as required. The post shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates or any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.
Raised Reflective Pavement Markers (RRPMs)

To assist in the night time location of fire hydrants the Contractor shall affix RRPMs on the road pavement opposite the hydrant in accordance with Standard Drawing STD 5320 or as otherwise approved by the Superintendent.

Installation of RRPMs shall be undertaken under safe traffic control condition and RRPMs are to be protected from traffic until the adhesive has fully set.

Clearing
The contractor shall clear the lid and surrounds of any overgrown grass and shrubs to a distance of at least 1m. Encourage residents' assistance in maintaining fire hydrants by mowing the surrounds and clearing shrubs to ensure the hydrant is visible from both sides and avoid parking within one meter of hydrants.

The Contractor shall replace all lids and other fitting immediately after completion of the work.

**WPRC -W203.13 REPORTING**

Details of the inspection and maintenance shall be recorded on the attached Hydrant Maintenance Report Sheet (Appendix A)
# APPENDIX A – HYDRANT MAINTENANCE REPORT SHEET

<table>
<thead>
<tr>
<th>Hydrant Number</th>
<th>Cannot Locate</th>
<th>Cats Eyes</th>
<th>Markers</th>
<th>Posts</th>
<th>Hydrant Condition</th>
<th>Leakage</th>
<th>Surround Condition</th>
<th>Box/cover Condition</th>
<th>Depth (mm)</th>
<th>Cover Height</th>
<th>Street Name</th>
<th>Date</th>
<th>Comments</th>
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**Note:** Insufficient depth means that the face of the hydrant below the top of the lid is not in the range 100-200 mm.

**Description Table**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cover Height</th>
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</thead>
<tbody>
<tr>
<td>A Good</td>
<td>H High</td>
</tr>
<tr>
<td>B Fair</td>
<td>G Good</td>
</tr>
<tr>
<td>C Poor</td>
<td>L Low</td>
</tr>
<tr>
<td>D Needs Attention - URGENT</td>
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</tbody>
</table>

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WATER HYDRANT MAINTENANCE
REGIONAL COUNCIL

DCC-W203-9
WESTERN PLAINS
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TECHNICAL SCHEDULE WPRC-W204 – WATER HYDRANT FLUSHING & DEAD END FLUSHING

WATER HYDRANT FLUSHING & DEAD END FLUSHING

WPRC-W204-2

WESTERN PLAINS REGIONAL COUNCIL
WPRL-W204: WATER HYDRANT FLUSHING & DEAD END FLUSHING

WPRL -W204.1 SCOPE

This Specification applies to the method of flushing water mains to remove contaminated water and/or sediment from the system.

The procedure applies to the flushing of scour valves on water mains as well as to the flushing of hydrants.

The work required to be performed under this contract shall also comply with the referenced documents in Clause WPRL-W204.2, unless specified otherwise herein.

WPRL -W204.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply unless noted otherwise. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply:

WESTERN PLAINS REGIONAL COUNCIL

WPRL-W203 Water Hydrant maintenance
Drawing STD 5320 Hydrant Location Markers for Urban Roads

Australian Standards

Works shall also comply with the current versions all relevant Australian Standards.

Water Services Association of Australia Standards

WSA03 Water Supply Code of Australia

WPRL -W204.3 BACKGROUND INFORMATION

Hydrants may be flushed for operational reasons such as to remove air from the water pipeline systems, to improve the taste/odour of the water or to remove sediment that has been disturbed.

It is common to regularly flush hydrants at dead ends to improve the taste/odour and to ensure that the water in the reticulation system has a chlorine residual.
Previously the Principal has discussed the issue of discharging water to the environment during hydrant flushing with the EPA. While sediment can be addressed by use of filter socks, there is a concern about the chlorine level of town water. Following the Principal’s studies and discussions with the EPA an outcome was reached that if the flushed water had to travel more than 150m over ground, or through a pipe or culvert before it reached a watercourse, the EPA would accept that any chlorine content would have dissipated. This 150m rule is reflected in this procedure.

**WPRC-W204.4 LABOUR, PLANT AND MATERIALS**

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

**WPRC-W204.5 WORKPLACE HEALTH & SAFETY (WHS)**

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor's activities for the duration of the Contract.

The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures
For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC-W204.6 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for *Traffic Control at Work Sites*, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.
WPRC -W204.7 PROTECTION OF THE ENVIRONMENT

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

WPRC -W204.8 NOISE

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

WPRC -W204.9 CUSTOMER NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

WPRC -W204.10 CUSTOMER COMPLAINTS

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

• The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
• The Contractor shall resolve all complaints within 5 working days.
• Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
• If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor’s cost.
The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

**WPRC-W204.11  DAMAGE TO PROPERTY**

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

**WPRC-W204.12  LOCATION OF HYDRANTS/SCOUR VALVES**

Hydrant/scour valve locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the location of the hydrants and scour valves.

If work cannot be undertaken by the Contractor due to failure to locate a hydrant or scour valve after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal’s staff. If the Principal’s staff locate the fitting within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

**WPRC-W204.13  WATER SUPPLY**

Water is available for the purposes of this contract from Principal hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.
WPRC-W204.14  **FLUSHING PROCEDURE**

The Contractor shall ensure erosion and sediment controls are in place if required.

The Contractor shall fit a flexible filter sock to the outlet of the hydrant standpipe or scour valve discharge. If a lay flat valve is used, then the flexible filter sock is to be fitted of the discharge of the flat hose.

- Direct run off water by means of lay a flat hose to a nearby park, grass verge or similar, if available and if this is not possible, direct run off water to stormwater; or
- If a hydrant is within **150m of a stormwater outfall**, run off water is to be discharged into a water tanker truck and transported to the closest park or grass verge where the water is to be discharged by means of lay flat hose.

The Contractor shall flush mains by opening selected hydrants and/or scour valves. Flushing shall be carried out until at least 1.5kL of water has been flushed, or longer, until dirty or otherwise contaminated water is no longer observed.

Following flushing, the Contractor shall shut off all hydrants and/or scour valves.

The Contractor shall be responsible for the transport and disposal of matter retained in the filter sock as if it were solid waste.

WPRC-W204.15  **REPORTING**

The Contractor shall record details of water mains flushing on the Hydrant Flushing Report contained in Appendix A or other format approved by the Superintendent.
# APPENDIX A – HYDRANT FLUSHING REPORT

<table>
<thead>
<tr>
<th>Hydrant Number</th>
<th>Start Meter (KL)</th>
<th>Finish Meter (KL)</th>
<th>Water Used (KL)</th>
<th>Cannot Locate</th>
<th>Hydrant Condition</th>
<th>Street Name</th>
<th>Date</th>
<th>Comments</th>
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**Note:** The minimum water to be used in flushing each hydrant is 1.5KL

**Description Table**

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<th>A</th>
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**Surround Valve Height**

<table>
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<th>High</th>
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<tr>
<td>G</td>
<td>G</td>
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WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W205

WATER METER READING
## TECHNICAL SCHEDULE WPRC-W206 – WATER METER REPLACEMENT

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WPRC -W205.1 SCOPE

This Specification applies to the reading of all residential, commercial and industrial water meters owned by the Principal within the Principal's area of operations.

The purpose of the work under this contract is to:

- obtain timely and accurate readings of all meters to enable the correct billing of accounts;
- obtain correct records of all meters on the premises;
- record the general condition of the meters;
- investigate any unusual or incorrect readings; and
- Return of all the reading and other information to the Principal.

This Specification does not apply to the maintenance or replacement of water meters.

WPRC -W205.2 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Principal details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

WPRC -W205.3 ITEMS TO BE SUPPLIED BY THE PRINCIPAL

The Principal will supply the following for the use in recording meter readings:

- Hand held electronic meter reading devices (ITRON FC300);
- Magnetic logos of the Principal for display on the Contractor’s vehicles;
- Photo identification tags for meter reading personnel; and
- Sufficient quantities of customer notification cards including Self Read Cards, Access to Water Meter Cards and Water Meter Cards.

At the completion of each reading cycle and at the end the Contract, the Contractor shall return the meter reading devices to the Principal. The Contractor shall be responsible for any and all damage to the meter reading devices, notwithstanding reasonable wear and tear.

The Contractor is required to supply all other materials, tools, equipment and labour for the execution of the Contract.
The wearing of Personal Protection Equipment is the Principal’s policy and it is a condition of the contract that all contractors and their employees comply to this policy at all times.

**WP-205.4 METER READING ROUTES**

Premises are grouped into Meter Reading Routes so that the Contractors’ meter reading staff may read meters on adjacent premises on the same day, as far as possible, to minimise the distances travelled. The route numbers and approximate number of properties are shown in Appendix A.

Residential and Commercial properties consist predominantly of houses or small adjacent lots and can be covered efficiently on foot. Residential areas may also have blocks of flats or home units included. Residences on small acreage lots may also be included.

**WP-205.5 SPECIAL ROUTE CONSIDERATIONS**

Special considerations may be required, and may include, but are not limited to:

a. **Car** – Meters in rural or isolated areas or have other special circumstances are sequenced in a Car Route. The Contractor shall provide all transport required for the meter reading staff to undertake the work.

b. **Keys** – The Contractor will be required to use a key to access these meters.

c. **Shops** – The Contractor will be required to co-operate with shop owners or occupiers in order to obtain readings and possibly move obstacles covering the meter. Obtaining a reading where the meter is located within shop premises may require the Contractor to read these meters during shop opening hours.

d. **Restaurants** – The Contractor will be required to co-operate with restaurant owners or occupiers in order to obtain readings and possibly move obstacles covering the meter. The Contractor may be required to read these meters during restaurant opening hours (which may be after 5pm).

The Principal reserves the right to alter Meter Reading Routes or their classification if necessary.

**WP-205.6 QUARTERLY METER READING**

The Contractor shall conduct Quarterly Meter Reading as per the Meter Reading Schedule and:

- Start reading meters on quarterly routes on the first business day of each Meter Read Quarter unless otherwise specified by the Principal - being 1st September, 1st December, 1st March and 1st June.
- Send meter reading data to the Principal on the same day the meter is read, where practicable or within three (3) business days of the date nominated in the Meter Reading Schedule if held back for quality audits and finalisation performed by the Contractor.
- Send meter reading data to the Principal within three (3) business days of the route being finalised.
- Complete all meter reads within ten (10) working days.
The Contractor must identify any non-residential properties that cannot be accessed during the normal business hours for reading purposes and shall:

- Update the Meter Reading Schedule with the appropriate access comments for the property;
- Re-allocate reading resources to assure the meter is read at the appropriate time;
- Instruct the Meter Reader to visit the non-residential property at the appropriate time; and,
- Discuss any ongoing issues at progress meetings with the Principal.

WPRC -W205.7 METER ACCESS

The Contractor is legally entitled to enter all premises for the recording of consumption and the Contractor shall make a reasonable effort to obtain actual readings of all meters.

Access to a property must be by an appropriate route such as driveway or path where these exist.

The Contractor shall allow customers reasonable time to answer door knocks or to restrain dogs.

Whilst meters are required to be accessible for reading, it is recognised that some meters may not be readily accessible. This could be due to meters being located inside residential and business premises, access obstructed by locked gates or other obstacles, dogs or other reasons.

When the Contractor arrive at a commercial premises before 09.00 am and the premises are closed, the Contractor must return to the premises to attempt a reading after 09.00am.

Where the Contractor is required to move obstacles in order to access the meter this must be only be done if it safe to do so.

In the event that a meter cannot be accessed and the premises are unattended, the Contractor shall leave a Meter Access Card. It is the Contractor’s responsibility to negotiate with the resident an appropriate time to access and read the meter.

If a customer refuses access, the Contractor shall not pursue the matter verbally or otherwise. Refusal of access shall be reported to the Principal.

Readings shall be carried out in such a manner as to avoid nuisance and/or damage to the property. The Contractor will be held entirely responsible for any damage to property, including meters, caused by the meter reading operations.

When leaving premises, any gates and doors are to be left as they were found on arrival (i.e. closed or open).

WPRC -W205.8 WATER METER READING PROCEDURE

The Contractor shall implement procedures to achieve accurate meter reading on the first visit to each property in a meter reading cycle.
The Contractor shall locate the water meter at the property and verify that the water meter number matches the number provided by the Principal for that property. Record the information pertaining to house number, meter positions or special reading instructions in the electronic meter reading device.

To ensure reading efficiency, the Contractor will be required to verify and record the following data:

- Read and follow any warning notes or special instructions applicable to each meter.
- Property address – where a lot number is indicated but a new house number has been allocated, the new house number shall be recorded.
- Meter location – where the location notes are incorrect, the correct meter location and relevant notes including grid location shall be recorded. The Contractor must ensure that all meter location details are entered into the system rather than maintaining personal notes on the meter location.
- Meter size and number of dials – where the size of the meter or the number of dials is incorrect, the correct meter size and number of dials shall be recorded.
- Warning note – where the warning notes are incorrect, the correct warning notes shall be recorded.
- Meter serial number – where the serial number is incorrect the the correct serial number on the meter shall be recorded. This may have potentially occurred for example, when the water meter for the property had been previously replaced.
- Confirm and record the water meter reading. Ensure that Meter Reading Data is entered into the meter reading device at the time the Meter Reader is at the Property.
- Record details of any abnormal condition of meters including damaged, stopped, dirty dials, broken or opaque glass or missing meters.
- Record details of any circumstances where a meter cannot be read including reasons for a meter reading being unobtainable or if the meter cannot be located.
- Record details of why access to a meter is considered difficult or unsafe. Leave the appropriate Customer Notification Card:
  1. Access to Water Meter – could not obtain access
  2. Water Meter – permit easy access.
- If the meter reading at an occupied residence indicates zero consumption, undertake a Tap Test. A Tap Test is performed by turning on the water tap next to the water meter. If the dial does not turn whilst the tap is turned on, the meter is not working (or has been bypassed). Record this in the meter reading device notes field. If tap is not present, record this in the meter reading device notes field.
- Record all suspected cases of meter tampering.
- Record details where meters have been placed in the wrong Route No.
- Leave a self-read card at the property where the meter cannot be read. Record that a card has been left on the meter reading device.
- Replace any covers and leave the site in a tidy condition.
- Monitor reading performance during the read cycle to identify potential issues and take appropriate action to ensure timely and accurate Meter Reading Data is received by the Principal. Record or inform the Principal that a re-read has been attempted at a property where a self-read card was left.
- Provide correct and validated Meter Reading Data and other information to the Principal within the scheduled timeframe as per WPRC-W205.5. This will be done by returning the meter reading devices for downloading or downloading through a modem link to the Principal’s computers.
WPRC -W205.9   FIRE SERVICE METERS (RED TAG)

A meter with a red tag indicates a fire service supply to the property and such meters will be read by the Contractor. The meter serial number should be entered into the handheld device in the notes field along with the term ‘FIRE’ Service

WPRC -W205.10   COMMENT CODES

To ensure reading efficiency, the Contractor will be responsible for identifying any abnormal conditions of a meter which may result in the meter being replaced or further action being required by the Principal.

The Contractor will ensure the following codes are used after conducting a visual inspection of the meter:

a) Damaged meter  
b) Dirty dial  
c) Incorrect meter  
d) Meter leaking  
e) Meter missing  
f) Meter not connected  
g) Meter not located  
h) Not accessible  
i) Stopped meter  
j) Vacant land  
k) Vacant premises  
l) Card left – Access to water meter  
m) Card left – Water meter permit easy access  
n) Self Read Card – Customer to read own water meter  
o) Construction site  
p) Dogs  
q) Vandalism  
r) Flooded  
s) Suspected tampering – notify Principal immediately

Record any other comments in the notes field of the meter reading device.

The Principal will consider the incorrect use of the above comment codes as Fictitious Meter Reading Data.
WPRC-W205.11  FICTITIOUS METER READING DATA

Fictitious Meter Reading Data refers to recording an inflated figure by simply increasing the previous reading by an incremental allocation (or close to it).

The Contractor must provide a process for prevention and management of fictitious meter reading data by the meter reader.

If the Principal has reasonable evidence that the Contractor has supplied Fictitious Meter Reading Data, the Principal may:

- Direct the Contractor to remove the meter reader/staff member from this Contract; and
- Recover from the Contractor all costs incurred by the Principal to identify, adjust and deal with Customer enquiries or any loss of revenue.

The Principal will consider systematic or persistent Fictitious Meter Reading Data as a significant breach of the Contract.

Penalty: $50.00 per meter read that has been proven to be fictitious.

WPRC-W205.12  HIGH/LOW WATER USAGE ALERT REQUIREMENTS

In the event, the Contractor is alerted to an unusual consumption from the system (outside of the predetermined parameters for a high or low reading), the Contractor will at the time:

- Re-read the meter and re-enter the meter reading;
- Provide the meter serial number; and
- Provide an appropriate comment code or freeform comment as to the situation on the Property to enable the Principal to take appropriate actions.

WPRC-W205.13  “SKIPPED READ” IMPROVEMENT PLAN

The Contractor will be required to provide the Principal with a plan on how the Contractor intends to assist in reducing the number of skipped meter reads over the term of the Contract. The plan will describe the Contractor’s intended actions for reporting to the Principal. The Contractor will be required to keep this plan up to date and discuss progress at progress meetings.

WPRC-W205.14  SELF-READ CARD PROCESS

The Principal requires every effort from the Contractor to read the Meter, however a self-read card must be left at a Property as required under the self-read card process.

If a meter in a Quarterly, Priority or Special Route cannot be read due to access issues the Contractor must leave a self-reading card at the Property (preferably in person to a Customer, or in a letterbox, or under a door).
A self-read card requests the customer to write the serial number and the water meter reading on the self-read card and return it to Council. As per WPRC-W205.3, the Principal will provide Self-Read Cards which:

- contain contact numbers for Customer to contact the Principal;
- contain the postal address for the Principal; and
- are pre-paid reply post.

WPRC -W205.15 QUALIFICATIONS

The Contractor shall ensure that the reading of water meters and all associated activities are carried out and supervised by suitably experienced and acceptably qualified or accredited personnel.

The Contractor shall ensure the staff performance is constantly monitored, evaluated and developed to achieve accurate meter readings.

WPRC -W205.16 CUSTOMER SERVICE REQUIREMENTS

The Principal is committed to developing and maintaining positive, effective relationships with Customers, local communities and other key stakeholders. The Services may involve customer contact and at times, has a significant impact on Customers. The Contractor represents the face of the Principal to the public and must:

- exhibit behaviours that reflect the Principal’s values and key communication messages
- respect Customers and provide them with a high standard of service.

The Contractor shall:

- have a clear customer focus when carrying out the Services within private properties and public areas
- shall communicate with Customers in a timely, courteous and informative manner
- complete the meter reading process in a customer friendly manner that results in minimal inconvenience or impact on the Customers
- take into account any special requirements a Customer may have when planning and carrying out the Services within a Property
- meet any commitment which the Contractor makes to the Customer with respect to the Services
- minimise disruption to Property, security arrangements and access.

WPRC -W205.17 PERSONNEL CONDUCT

The Contractor is responsible for the proper conduct of personnel engaged during the contract inclusive of personnel provided by a subcontractor or agency hire provider.

If the Principal considers that any personnel to be guilty of misconduct or unsuitable to be engaged during the contract term the Principal may:

- direct the Contractor to stop employing any personnel; and,
- may prohibit the personnel from performing the contract services,
The Contractor must:

- comply immediately with the Principal’s direction; and
- not allow those personnel to perform the Services again without the written consent from the Principal.

**WPRC -W205.18 INCIDENT NOTIFICATION AND INVESTIGATION**

The Contractor shall:

- notify the Principal immediately of any incident or foreseeable event likely to affect the Contractor’s ability to meet the performance requirements and obligations contained in this contract.
- advise the Principal of the actions taken to overcome the issue and any issues arising from the incident and provide regular progress reports
- investigate all incidents and ensure that investigations are performed by suitably qualified and competent Personnel
- notify the Principal of the investigation and engage the Principal in investigations if required.
- provide a report to the Principal within 48 hours of the incident outlining:
  1. the cause of the incident;
  2. proposed actions and timeline for completion;
  3. investigation details; and
  4. improvement actions taken or planned and timeline for completion to prevent the incident from reoccurring.

**WPRC -W205.19 CUSTOMER COMPLAINTS**

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Principal of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Principal may without any further notice undertake to resolve the complaint at the Contractor’s cost.

The Contractor must notify the Principal if any customer complaints are received by the Contractor. Notification must be received by the Principal as soon as practicable and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.
WPRC -W205.20  DAMAGE TO PROPERTY

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

WPRC -W205.21  DEALING WITH DOGS

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.

Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.

Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Principal for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Principal who will arrange for the Principal’s Animal and Ranger Services to assist.

WPRC -W205.22  FUTURE INITIATIVES - AUTOMATIC METER READING (AMR)

During the term of Contract, the Principal may install meters that are to be read with an Automatic Meter Reading (AMR) handheld device. The Principal will discuss these initiatives with the Contractor at the appropriate time.
Table 1 Meter Reading Routes

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<tr>
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<tr>
<td>2</td>
<td>C - Bligh/Cobra To Darling Street</td>
<td>464</td>
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<tr>
<td>5</td>
<td>C - Darling/Cobra to Railway Line</td>
<td>627</td>
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<tr>
<td>7</td>
<td>S - Cobra/Boundary/Fitzroy Sts</td>
<td>1194</td>
</tr>
<tr>
<td>8</td>
<td>S - Macq/Margaret/Boundary Sts</td>
<td>811</td>
</tr>
<tr>
<td>9</td>
<td>S - Fitzroy/Boundary/Cobra Streets</td>
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<tr>
<td>14</td>
<td>N - Erskine to River Street</td>
<td>778</td>
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<td>17</td>
<td>E - Wheelers to Sheraton Road</td>
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<tr>
<td>20</td>
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<td>W - Victoria to Thompson</td>
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<td>27</td>
<td>W - North to Macq River</td>
<td>522</td>
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<td>W - North to Depot Road</td>
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<td>W - East St to Golf Course</td>
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<td>SE - Avian &amp; Holmwood Estates</td>
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<td>N - North Industrial</td>
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<td>E - Y'wonga &amp; Sheraton Meadows</td>
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* Approximate no. as at December 2013
APPENDIX B – EXAMPLE METER ACCESS and SELF READ CARDS

TO THE RESIDENT

Address: __________________________________________

Today, Council’s water meter reader could not access the water meter on your property because of:—

☐ Locked Premises ☐ Dogs ☐ Other Reason

It would be appreciated if, within the next three days, you would record the meter reading in the space provided below and return this card or phone Council on (02) 6801 4281 with the reading.

Owner’s Name: __________________________________________

Meter Serial No.: __________________________________________

Date Read: __________________________________________

(Please read your water meter and write down the BLACK numbers only in the space provided.)

of the Technical Services Division
called today

To __________________________________________

FOR MORE INFORMATION:
PHONE: (02) 6801 4000
FAX: (02) 6801 4259
EMAIL: dcc@dubbo.nsw.gov.au
**Water Meters**

Water meters are an important part of Council’s water supply infrastructure. There are over 12,000 water meters in the Council’s water meter fleet. Meters accurately record the water consumed by each property. This enables billing by Council for the water consumed and permits Council to account for all the water supplied to the community.

**Access to meters**

Meters are read four times each year and you can assist Council by regularly trimming shrubs from around the meter, so as to permit ready access by the water meter reader.

Under Sections 191, 191A or 192 of the Local Government Act, 1993, Council has powers of entry to private property to carry out water supply work such as meter reading. It would be appreciated if you could assist with providing access.

If your meter is in a locked area or, if there is a dog in the yard when the meter reader calls, you may receive a card in your letterbox asking you to self read your water meter. The card gives instructions on how to do this and doubles as a reply paid letter, which may be posted back to Council without a stamp. If you receive one of these cards and you have any questions, please contact Council’s Customer Service Centre on (02) 6801 4000.

It is an offence under Section 636 of Local Government Act, 1993 to tamper or interfere with the normal operation of water meters. If you believe that your meter has been tampered with, please contact Council’s Customer Service centre on (02) 6801 4000 as soon as possible.

Council sometimes installs tamper evident devices on water meters. These are modern plastic devices that replace the seals used in the past. If one is fitted to your meter, you do not have to do anything.

If you damage your meter or the pipes connected to it contact Council as soon as possible.

**Entry to private property**

Under Sections 191, 191A and 192 of the Local Government Act 1993, Council has a right of entry to private property for the purpose of carrying out necessary maintenance activities. Council will first take reasonable steps to contact the property owner. If the owner cannot be contacted, Council may enter the property and carry out the necessary work. In such cases, Council will place a card in your letterbox advising that Council has entered your property. If you receive such a card and have any questions about why Council needed to enter your property or the work undertaken there, please contact Council.

Western Plains Regional Council has awarded a two-year contract for the quarterly reading of Dubbo residents’ water meters to Skilltech Consulting Service commencing this month for the latest quarter’s reading.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W206

WATER METER REPLACEMENT
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WPRL-W206: WATER METER REPLACEMENT

WPRL-W206.1 SCOPE

This Specification applies to the replacement of residential water meters nominally 20mm in diameter. The purpose of the work under this contract is to remove inaccurate and aged water meters from the Principal’s water supply system in order to maintain accurately reading meters.

This Specification does not apply to the supply of water meters, which are purchased separately by the Principal.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRL-W206.2, unless specified otherwise herein.

WPRL-W206.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a Project Specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or Project Specific Specification shall apply.

**Australian Standards**

AS 3500.1 Plumbing and drainage – water services
AS 3565 Meters for water supply

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

**Water Services Association of Australia Standards**

WSA03-2011 Water Supply Code of Australia
N/A WSAA Product Specifications

WPRL-W206.3 QUALIFICATIONS

The replacement of water meters and all associated activities shall be carried out and supervised by suitably experienced and acceptably qualified or accredited personnel. These personnel shall be either a licensed plumber or suitably experienced persons operating under a licenced plumber.

The licensed plumber shall hold appropriate qualifications issues by a registered training organisation and have attended a relevant training course and received accreditation relating to the work being carried out.
CONTRACT NO. WPRC -W206.4   PROTECTION OF THE ENVIRONMENT

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

WPRC -W206.5   DAMAGE TO PROPERTY

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by his operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

WPRC -W206.6   CUSTOMER COMPLAINTS

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor's cost.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

WPRC -W206.7   DEALING WITH DOGS

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.
Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.

Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal’s Animal and Ranger Services to assist.

**WPRC -W206.8 ITEMS TO BE SUPPLIED BY THE PRINCIPAL**

The Contractor is required to supply all materials, tools, equipment and labour for the execution of the Contract with the exception of the water meter assembly and couplings which will be supplied by the Principal to the Contractor free of charge.

The water meter assemblies, couplings and washers will be supplied to the Contractor exactly as received from the manufacturer.

The Principal will supply an electronic device (iPad type or similar) for the use in recording meter replacement documentation. At the completion of the Scope of Work, the Contractor shall return the electronic device to the Principal. The Contractor is responsible for any and all damage to the electronic device, notwithstanding reasonable wear and tear.

**WPRC -W206.9 DELIVERY, TRANSPORTATION, HANDLING AND STORAGE OF MATERIALS**

The Contractor shall transport, handle and store all products and materials in accordance with the manufacturers’ recommendations and in a manner that prevents damage or deterioration or excessive distortion.

The Contractor shall reject any damaged or defective products or materials along with any unauthorised or unspecified products or materials unless written approval has been given for their use. No rejected products or materials shall be used in the Works which shall be placed in a quarantined area and removal from the site arranged by the Contractor at the earliest opportunity.

**WPRC -W206.10 WORK SCOPE**

The Contractor shall remove the existing water meter as listed in the Scope of Work and replace with a new water meter. All work is to be carried out in accordance with AS 3500 and the applicable national and state requirements in place at the time such as the Local Government Act 1993 Water Supply Regulations.
The typical water meter arrangement is as shown in the figure below (extract from WSAA standard drawing WAT-1109). Whilst this arrangement is typical, the Contractor shall be responsible for inspecting the actual existing water meter installations listed in the Scope of Work to determine the actual configuration.

**WP RC -W206.11 WATER METER COLLECTION**

The Contractor shall be responsible for the collection and transportation of new water meters from the Principal’s depot, and then return of the removed water meters and any removed backflow prevention devices to the Principal’s depot.

The Principal’s depot is located in Hawthorn Street, Dubbo.

Once evidence of the insurances being taken out are accepted by the Superintendent, a group of water meters of an agreed quantity shall be booked out from the Principal’s depot. These meters shall be signed out on the appropriate proforma.

**WP RC -W206.12 METER ACCESS AND VERIFICATION**

The Contractor shall locate the water meter at the property and verify that the water meter number matches the number provided by the Principal for that property. In the event that the water meter number at an address listed does not match, the Contractor shall not proceed with the replacement and shall advise the Superintendent. Advice to the Superintendent shall take the form of quoting the actual meter number and the meter reading in the “Comments” column of the proforma. On these occasions, the water meter for the property may be been previously replaced for some other reason.
The Contractor shall verify the pipe material of the water service connection on the Principal’s side of the water meter. If the material is galvanised iron, the Contractor shall not proceed with the replacement and shall advise the Superintendent.

Whilst meters are required to be accessible for reading and replacement, it is recognised that some existing meters may not be readily accessible. This could be due to meters being located inside residential and business premises, access obstructed by locked gates, dogs or other reasons. In the event that a meter cannot be accessed and the premises is unattended, the Contractor shall leave a Meter Access Card. It is the Contractor’s responsibility to negotiate with the resident an appropriate time to access the meter and undertake the replacement.

WPRC -W206.13    WATER SUPPLY SHUT DOWN

Following verification of the water meter number and water service pipe material, the Contractor shall advise the resident that their water supply will be shut down for the duration of the replacement. In the event that it is not convenient for the resident at the time, the Contractor shall reschedule a more suitable time with the resident to replace the water meter. Shut down of the resident’s water supply shall only be undertaken between the hours of 9am and 5pm Monday to Friday (excluding Public Holidays) unless otherwise requested by the resident or Superintendent.

WPRC -W206.14    METER REPLACEMENT

If agreed to by the resident, or if no one is at the premises, the Contractor shall proceed with the replacement of the water meter as follows:

• Confirm the water meter reading and record this on the proforma.
• Use an approved electrical bridging conductor before proceeding with the work using safe work practices as per the Essential Energy “Electricity and Plumbing” brochure, provided in Appendix A.
• Carefully remove the existing water meter.
• If there is a separate backflow prevention device (usually a double check valve assembly), the Contractor shall remove the internal assembly of the backflow prevention device so that there is no impediment to water flow. If removal of the internal assembly is not possible, the Contractor shall remove the entire backflow prevention device using couplings to be supplied by the Principal.
• Install the new water meter and plumb between any resulting gap with approved fittings. Any required pipe or fittings are to be supplied by the Contractor (noting that the only materials supply by the Principal are as specified in clause SW-206.8).
• The Contractor shall reconnect the water supply to the premises and ensure the new meter assembly is not leaking any water, and by using a hosecock or similar, he/she shall confirm the meter is registering flow.
On completion of the work the Contractor shall:

- Remove the electrical bridging conductor.
- Collect and remove any debris from the site and dispose of properly.
- Complete the meter changeover form required including meter reading and recording and recording the meter reading of the new meter, of the date of the changeover and the signature of the person who effected the meter replacement.
- Leave a Meter Replacement card in the letterbox of the property in all cases, even if there was a resident at home. The Meter Replacement card shall be supplied by the Principal and is a courtesy card to advise the resident what has occurred. It provides a phone number if the resident has any questions that may arise after the Contractor has left the site.

**WPRC -W206.15 ELECTRICAL SAFETY**

The Contractor shall ensure that the Works are carried out in a safe manner, taking into account electrical safety risks and work practices. The Contractor shall comply with Essential Energy’s “Electricity and Plumbing” brochure contained in Appendix A.

Before carrying out replacement of any meter, the Contractor shall carry out an electrical safety test as required by AS 3500.1.2. In the event that electrical potential is indicated, the Contractor shall not proceed with the water meter replacement and shall immediately notify the electricity supply authority and the Superintendent. The Contractor shall then negotiate with the electricity supply authority and the customer before completing the water meter replacement.

The Contractor shall connect a bridging conductor with a minimum current rating of 70A across the intended gap. The conductor shall be fitted with suitable clamps onto sections of pipe cleaned back to bare metal. The bridging conductor shall not be removed or conductivity broken until work on the water service has been completed and continuity of metallic service pipe is restored.

**WPRC -W206.16 RETURN OF REMOVED WATER METERS AND DOCUMENTATION**

Following replacement of the group of water meters, the Contractor shall return the removed water meters, any removed backflow prevention devices and completed changeover forms to the Principal’s depot. Following acceptance of the completed documentation by the Principal, the Contractor may then book out another group of water meters from the Principal’s depot for use.

The Superintendent shall supply the Contractor with a spreadsheet containing water replacement data for the meters to be replaced. The Contractor shall complete the spreadsheet at return this to the Superintendent at regular intervals upon the completion of each group of water meter replacements.

The Principal will supply an electronic device (iPad type or similar) for the use in recording meter replacement documentation. Completed electronic meter replacement forms shall be submitted to the Superintendent at regular intervals upon the completion of each group of water meter replacements.
WPRC -W206.17    WATER METER READING PERIODS

Water meter replacement works shall not be undertaken 7 days prior to or during the Principal’s quarterly water meter reading periods, which take place during the following dates:

- 1st to 14th December
- 1st to 14th March
- 1st to 14th June
- 1st to 14th September
What should I do before starting work?
- Complete a risk assessment so as to identify and put in place the appropriate control measures to prevent any hazards (including work practices and procedures) which may have the potential to harm the health or safety of a person. This should be completed for each paddock and piece of machinery to be used.
- Know the location of underground powerlines and their proximity to your work site before commencing digging – obtain accurate, up-to-date maps/diagrams showing the location of powerlines on the property from Essential Energy.
- Check gutters and metal roofs prior to commencing a job, as they can become live due to deteriorating insulation or electrical wiring.
- Use a safety switch to reduce the risk of shock from portable tools.
- Enquire with the occupant if they have experienced any minor electrical shocks from taps, sink etc.
- Visually check the connections of the electrical services at both ends, pole and house are present with no arcs or sparks.
- If accessible check the condition of earth connection at earth stake and hot water system bond.
- Test water pipes with a self-testing voltage indicator for stray voltage.
- It is strongly recommended that a powerpoint safety tester be purchased and used to check the customer’s powerpoint before connecting equipment. These simple devices can be purchased from most electrical wholesalers.
- If the earth wire needs to be moved, disconnected or shows signs of being damaged or where any existing metallic pipe is to be replaced in part or in its entirety by plastic pipe or other non-metallic fittings or couplings the work must not commence until the earthing requirements have been checked by an electrical contractor and modified, if necessary.
- If isolation of electricity supply is required contact Essential Energy on 13 23 91.
- Contact Essential Energy supply interruptions on 13 20 80 if a fault is apparent.

Electrical bridging cable requirements
- Visually check the bridging conductors for any damage before use, every time.
- Ensure bridging conductors have a current rating of not less than 70 amps.
- Ensure strong clamps are fitted to each end of the electrical bridging conductor.

Primary control measures when changing water meter
- Inform the customer and isolate electrical supply if practical.
- Locate main switch/s, there can be more than one main switch and turn off, attaching a “Do not operate” tag or lock the switchboard until work is completed. Remember this may not isolate all stray voltage.
- Ensure PPE is used, especially insulated electrical gloves (minimum 500 volts – ensure they are checked for damage such as holes, every time prior to use).
- Thoroughly clean a section of metallic pipe each side of the work area (eg meter) and ensure bridging cables have good physical contact with the metal pipes.
- Bridging must not be broken or removed until all work on the water service is completed and continuity of the metallic service pipe is restored.

Be safe, because they need you.
Safe work habits

- To prevent electric shock, use a bridging conductor when cutting any section of water pipe
- Exercise extreme caution when working near the point of attachment of electrical supply lines to the house
- Look out for electrical arcs or tingles – if identified do not commence work and contact Essential Energy on 13 20 80.

What else can I do to make my worksite 'power safe'

- Find out about any work areas which may be hazardous, electricity, gas, water etc
- Know the location of overhead and underground powerlines and their proximity to your work site before commencing work (digging or climbing)
- Look for obvious signs of underground services such as conduits, pipes, warning tape, bricks or equipment
- Test gutters and metal roofs prior to commencing a job, as they can become live due to deteriorating insulation on electrical wiring.

For more information

Essential Energy’s Public Safety team is available to conduct Electrical Awareness sessions and discuss any questions relating to electrical safety.

For more information on electrical safety please call Essential Energy:

General enquiries 13 23 91
Supply interruptions 13 20 80
or visit essentialenergy.com.au/safety

SAFETY FIRST:

- Know the location of overhead and underground powerlines near the worksite
- Ensure safety equipment are maintained (see Essential Energy’s fact sheet ‘Work near overhead powerlines’ for more information)
- Always use a safety switch (RCD)
- Ensure PPE is used and in working condition
- Test for stray voltage using a self-testing voltage indicator
- Always bridge pipes that might carry current
- Leave bridge in place until work is finished
- If any electrical fault is suspected immediately notify the consumer and Essential Energy on 13 20 80.

Determine whether there are any new hazards

- Have the implemented control measures resulted in the introduction of any new hazards or in the worsening of any existing hazards?
- Have the changes made to control exposure to the assessed risk(s) resulted in what was intended?
- Has exposure to the assessed risk(s) been eliminated or adequately reduced?
TECHNICAL SCHEDULE

WPRC-W207

SUPPLY OF WATER TREATMENT CHEMICALS
# TECHNICAL SCHEDULE WPRC-W207 – SUPPLY OF WATER TREATMENT CHEMICALS

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WPRC-W207: SUPPLY OF WATER TREATMENT CHEMICALS

WPRC -W207.1 SCOPE

This Specification applies to the supply and delivery of water treatment chemicals to the Principal’s water supply sites.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W207.2, unless specified otherwise herein.

Details of the type, quantity and frequency of chemicals to be supplied under this Contract will be outlined in the project specific scope of work document.

WPRC -W207.2 REFERENCED DOCUMENTS AND STANDARDS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1678 Emergency procedures guide - transport
AS 1894 The storage and handling of non-flammable cryogenic and refrigerated liquids
AS 2865 Confined spaces
AS 2927 The storage and handling of liquefied chlorine gas
AS 3780 The storage and handling of corrosive substances
AS 3833 The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers
AS 4326 The storage and handling of oxidizing agents
AS 4332 The storage and handling of gases in cylinders

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Safe Work Australia

Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice, 2011
Labelling of Workplace Hazardous Chemicals Code of Practice, 2015

WPRC -W207.3 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.
WPRC -W207.4 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

WPRC -W207.5 QUANTITY OF SUPPLY

The estimated of chemicals can vary considerably over time and is largely dependent on water supply consumption/demand. Subject to agreement, the Principal may vary the estimated quantity of chemicals to be supplied at any time.

WPRC -W207.6 CHEMICALS SUPPLIED

Chemicals supplied shall be suitable and approved for use in water treatment applications. The grade of chemicals provided by the Contractor will be of ‘Industrial’ or ‘Technical’ grade, unless otherwise specified by the Principal.
The Contractor must provide a certified statement of analysis of each chemical supplied. The Principal reserves the right to make a request for supplementary technical details as required. Each delivery under this Contract shall conform to the certified analysis and specified standards.

The Principal may undertake an audit and testing of the chemicals supplied under this Contract. In the event of defective chemicals being supplied and found to have contaminated material already in the Principal’s storage tank, the Contractor will be liable for both the defective chemicals supplied and the contaminated materials. The contaminated materials shall be removed and replaced at the Contractor’s cost.

**WPRC -W207.7 DELIVERY TIMING**

The Contractor shall make deliveries only between 8:30am and 3:30pm Monday to Friday, excluding public holidays. Out of hours deliveries will only be accepted by prior arrangement with the Principal’s Representative.

The Principal or representative may refuse delivery at any time, if they reasonably consider that there is a genuine safety or operational issue that prevents safe delivery. In such instances, the Principal’s Representative and the Contractor shall arrange for the rescheduling of the delivery, and will agree any costs associated with the rescheduled delivery.

**WPRC -W207.8 DELIVERY DOCUMENTS**

The Contractor shall not make any delivery unless written confirmation and/or purchase order has been received from the Principal.

Each delivery shall be accompanied by the Contractor’s delivery record notice bearing reference to the Principal’s purchase order number, chemical type delivered, concentration and quantity delivered. The following information must be marked legibly on each identifying document:

- Certified net weight or net volume of delivery
- Batch number
- A certificate of analysis
- Name of the manufacturer
- Brand name, if any

For bulk chemical deliveries, the Contractor shall use a flowmeter integral to the delivery vehicle to provide evidence of volume delivered where the chemical is provided in liquid form. Where the chemical is provided in powder form, the Contractor shall provide evidence in a form acceptable to the Principal of the weight of product delivered. Where the chemical is provided in gas form, the Contractor shall provide evidence of weight or volume at a defined pressure or product delivered in a form acceptable to the Principal.
The Principal’s personnel shall confirm the amount of product delivered by comparing the change in the Principal’s storage tank before and after delivery as possible. The Principal may request further evidence of the delivery amount confirmation method, if variation greater than 5% of delivered volumes is detected. This may include viewing calibration check records of the measurement devices.

Where applicable the Contractor is also required to transfer each delivery from the bulk road tanker to the nominated storage facility using pumps and hoses integral to the delivery vehicle. Bulk tankers should have fixed discharge pipework on the tanker with an isolation valve prior to the coupling, which for liquid and powder deliveries must be a camlock fitting of type approved by the Principal.

WPRC -W207.9 SPILLAGE

The Contractor is responsible for the clean-up of any hazardous chemical/chemical or other material spillage from delivery vehicles occurring during transportation, or delivery to the receiving site. Any spillage of hazardous chemical/chemical due to actions of the Contractor or its personnel must be cleaned up, disposed of and replaced at the Contractor’s expense. On request from the Contractor when spillage occurs within the Principal’s site, the Principal may at its sole discretion assist in the containment and cleaning up of the spilled material. The cost of such support by the Principal will be charged back to the Contractor.

Any uncontrolled spill of a hazardous chemical/chemical must be logged as an incident with the Principal and immediately reported to the Principal’s site operator.

During transportation, the Contractor is responsible for ensuring that driving practices and container design prevent spillages. The Contractor is solely responsible for meeting all legal (including environmental and safety) requirements applicable to the transport of any chemicals. Should a spill occur during transportation, the Contractor must notify the Principal and the EPA as soon as practicable.

WPRC -W207.10 SAFETY DATA SHEETS AND LABELLING

The purpose of a Safety Data Sheet (SDS), formerly Material Safety Data Sheet (MSDS) is to inform the purchaser and/or user of the possible hazards and health effects of a chemical along with details of safe storage, handling and disposal practices. In addition the SPS also contains information on emergency procedures associated with the chemical.

The Contractor shall provide the Principal with a SDS for every chemical supplied under this Contract and prepared in accordance with the Safe Work Australia Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice, 2011 (Code of Practice). The Contractor must amend SDS whenever necessary and review them in accordance with the Code of Practice.

As an exception, prior to 31 December 2016, a MSDS prepared under the NOHSC National Code of Practice for the Preparation of Material Safety Data Sheets, 2013 may be provided in place of a SDS.
In addition, the SDS must be made available to all workers for all products classified as hazardous according to WHS legislation.

All packaged product must be labelled and meet the minimum requirements as stated in the Safe Work Australia Labelling of Workplace Hazardous Chemicals Code of Practice, 2015.

**WPRC -W207.11 VEHICLES AND TRANSPORT**

The Contractor shall select a suitable type and size of vehicle to deliver chemicals under this contract that have sufficient capacity for the volume to be transported, are efficient, suitable for the material being transported and meet the Principal’s site access, delivery and unloading requirements. Vehicles used shall be capable of delivering chemicals within the existing routes and confines of the site and its chemical delivery facilities.

Transportation of chemicals including type of vehicle and transport routes shall comply with all legislative and regulatory requirements.

**WPRC -W207.12 ENVIRONMENT**

The Contractor shall ensure vehicles used for chemical transport and deliveries are regularly maintained and inspected to minimise risk of failure leading to environmental harm (e.g. leaks or excessive noise or emissions). The Contractor’s drivers shall be competent to operate the vehicles in a manner that avoids environmental impact and shall have completed an environmental protection induction program arranged by the Contractor.

The Contractor’s drivers shall be aware of their legal responsibilities under relevant legislation. These may include:

- Training in environmental awareness;
- Knowledge of environmental incident reporting procedures;
- Knowledge of and training in appropriate action to be undertaken to minimise environmental harm; and
- Provision of equipment such as spill kits to minimise environmental harm.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W208

PIPE BURSTING OF WATER MAINS
## TECHNICAL SCHEDULE WPRC-W208 – PIPE BURSTING OF WATER MAINS

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WPBC-W208: PIPE BURSTING OF WATER MAINS

WPBC-W208.1 SCOPE

This Specification applies to the replacement of existing water supply mains using apparatus which travels along the existing main, destroying it as it goes, while drawing a replacement pipe into the space previously occupied by the pre-existing main (pipe bursting).

The process is to be completed with minimal excavation.

The replacement pipe may be required to have an internal diameter similarly sized to the pre-existing pipe or may be required to have a larger internal diameter than the pre-existing pipe.

All live connections and side lines are to be reinstated.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPBC-W208.2, unless specified otherwise herein.

Details of the mains covered by the contract will be provided by the Principal.

WPBC-W208.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply unless noted otherwise. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

Replacement pipe shall be designed in accordance with the following Codes, Standards and Manuals, where relevant:

AS 2566 Buried Flexible Pipelines
AS 4130 Polyethylene (PE) pipes for pressure applications

Works shall also comply with the current versions all relevant Australian Standards.

Water Services Association of Australia Standards

WSA01 Polyethylene Pipeline Code
WSA03 Water Supply Code of Australia
**WPRC-W208.3 LABOUR, PLANT AND MATERIALS**

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

**WPRC-W208.4 WORKPLACE HEALTH & SAFETY (WHS)**

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor’s employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

The Contractor is to conform to the requirements of the Work Health and Safety Act 2011.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.
The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC -W208.5 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for Traffic Control at Work Sites, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

**WPRC -W208.6 PROTECTION OF THE ENVIRONMENT**

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.
WPRC - W208.7  NOISE

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

WPRC - W208.8  CUSTOMER NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

WPRC - W208.9  ENTRY TO PRIVATE PROPERTY

If entry to private property is required then the Contractor is to advise the property owner a minimum of two (2) clear working days in advance of the work proceeding. This advice is to be in the form of a signed letter which the Principal will supply in this regard. The Contractor shall be responsible for duplication and all associated costs. In addition to this written advice, the Contractor shall also verbally advise the resident on the day that the work is programmed and the work is about to commence. If there is not a resident in attendance at the time the Contractor’s personnel have arrived on site, then the Contractor shall proceed with the work provided that the letter of notification had been previously sent the required timeframe in advance of entry to the property.

On completion of work the Contractor shall leave a Calling Card in the letterbox of the property. The Principal shall provide to the Contractor the necessary cards. The Contractor is responsible for all duplication and associated costs.

The Contractor shall not, without prior approval of the Superintendent, enter private property outside the hours of 8.00am to 5.00pm Monday to Friday or at any time on Public Holidays.
WPRC-W208.10    CUSTOMER COMPLAINTS

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, and no later than the close of business (5:00 PM) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor’s cost.

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

WPRC-W208.11    DAMAGE TO PROPERTY

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

WPRC-W208.12    DEALING WITH DOGS

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.
Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.

Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal’s Animal and Ranger Services to assist.

**WPRC -W208.13  LOCATION OF WATER MAINS**

Recorded water main and surface fitting locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the locating the water main and surface fittings on site.

If work cannot be undertaken by the Contractor due to failure to locate a surface fitting after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal’s staff. If the Principal’s staff locate the fitting within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

**WPRC -W208.14  WATER SUPPLY**

Water is available for the purposes of this contract from Principal hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.

**WPRC -W208.15  ISOLATION OF WATER MAINS**

The Principal shall operate valves to isolate the subject water main prior to the cleaning operation and shall operate valves to recharge the subject water main at the completion of the cleaning operation.

Any single incidence of water supply interruption under this contract is not to exceed six (6) hours, and is not to occur outside the hours of 9.00AM to 3.00PM Monday to Friday. The Contractor shall
implement a temporary water supply system or other approved approach to limit any disruption to the water supply to customers to 6 hours.

**WPRC -W208.16 REPLACEMENT PIPE**

The replacement pipe shall be PE pipe (and fittings) compliant with WSAA Product Specifications WSA PS-207, WSA PS-208 and WSA PS-215 and shall be:

- PE100.
- Manufactured in accordance with AS 4130.
- Minimum pressure class PN16.
- Coloured black with blue stripes for potable water
- Electrofusion or butt welded jointed.
- Installed with detectable marker tape to assist with future pipe location.

The replacement pipe shall be capable of withstanding scoring damage as it is drawn into place, or otherwise a sacrificial outer casing pipe shall be utilised.

**WPRC -W208.17 PIPE BURSTING**

The Contractor shall launch and recover the bursting head by removing a section of pipe from the conduit to be replaced. The bursting head shall travel along the conduit breaking the conduit as it goes and pushing the broken pieces into the surrounding ground.

The bursting head shall draw behind it a replacement pipe which shall occupy the space previously occupied by the burst conduit.

The bursting process shall cause minimal disturbance to the surface.

The pulling end and intermediate points of the pipe shall be protected against damage.

All Work shall be carried out under the technical direction of a qualified and experienced person who has had suitable training and experience in the installation of the liner, nominated by the Contractor in its Tender and accepted by the Principal.

The Contractor shall have submitted with its Tender full details of the installation procedure and the Installation Quality Plan for the lining to the Superintendent for approval based on the proposal made in its Tender. The Contractor shall provide all the equipment for the safety of its workforce and for installing the replacement pipe in accordance with the procedures approved by the Superintendent.

The Contractor shall ensure that the pipe bursting equipment has the capability of limiting the bursting force during the installation, so as not to exceed the manufacturers recommended tension loads for the pipe. This is to ensure the newly installed pipe is not damaged by the excessive pulling force.
**WPRC -W208.18 EXISTING SERVICES**

The Contractor shall be responsible for the identification and protection of existing services where these are crossed by pipe bursting activities.

The Contractor shall ensure that all utilities crossing within 600mm of the existing bursting pipe have soil excavated and removed to relieve pressure caused by heaving during the bursting operation.

**WPRC -W208.19 SETTLEMENT AND SURFACE HEAVE MONITORING**

The Contractor shall take all care and necessary precautions to protect existing structures, utilities and services in planning and execution of the Works. All potential affected work area shall be visually inspected to document condition prior to any work conducted. Any damage to adjacent properties caused by all or part of this work shall be repaired and restored to its original condition at the Contractor’s expense.

The Contractor shall ensure that the pipe bursting system is monitored by the operator at all times. The minimum information that must be monitored shall include, rate of advance length of conduit installed, thrust or pull force, deviation from line and gradient, and valve positions.

Where crossing of roadways and railways are involved, the Contractor shall be required to record and report any ground settlement to the satisfaction of the respective controlling agencies.

Where crossing any utilities and pipelines during the pipe bursting process, the Contractor shall monitor ground settlement or heave directly above and 3m before and after the utility or pipeline intersection.

The Contractor shall cease operations when monitoring points indicate any surface disruption that exceed the degree specification. The Contractor shall propose immediate action for review and approval by the Client to remedy the problem.

Should voids in the ground occur during the pipe bursting operation, the voids shall be backfilled promptly to the extent practicable with soil. Where the local ground material is not suitable for this purpose, the Contractor shall import suitable materials.

**WPRC -W208.20 PIPE JOINTING**

All pipe jointing of PE pipe shall be undertaken in accordance with WSA01 and the manufacturer’s recommendations and specifications.

All PE pipes shall be jointed using the butt-fusion method, with the exception of connections to existing pipes that may be undertaken using electrofusion. All joints shall be leak-free, straight and true and have uniform roll-back beads within limits specified by the manufacturer. All butt-fusion joints for water mains do not require for the internal bead to be removed.
Should the pre-inspection of the pipe material reveal defects, the defective section shall be cut out of the pipe. Similarly, should a joint be found to be defective, the joint shall be cut out and a new joint made. All such work shall be at these cost of the contractor.

**WPRC-W208.21 CONNECTION TO EXISTING LINES**

The Contractor shall connect the new PE pipe to existing lines at each end of the job and at all live property connections in accordance with Principal’s standard specifications using approved fittings and practices, to the satisfaction of the Superintendent.

**WPRC-W208.22 RE-ESTABLISHMENT OF EXISTING FITTINGS**

The Contractor shall re-establish all pre-existing hydrants, valves and other fittings on the new MDPE pipe in accordance with the Principals’ standard specifications using approved fittings and practices, to the satisfaction of the Superintendent.

**WPRC-W208.23 ADDITIONAL ACTIVITIES INCLUDED IN SCOPE**

The following activities are deemed to be included in the scope of work:

- Removal of any obstructions necessary to provide access to any water main and replacement if necessary following completion of the work.
- Locating, uncovering and ‘freeing’ of all surface fitting covers such that they are accessible for the carrying out of the works (refer to Clause WPRC-W208.14 if any surface fitting cannot be located after all reasonable effort).
- Rebuilding of surface fittings where removal of fitting lid, surround or components are necessary during any part of the contract.
- All existing lines adjacent to the line to be replaced are to be plugged to prevent debris, runoff, etc. from entering.

**WPRC-W208.24 EQUIPMENT STUCK IN CONDUITS**

If any of the Contractor's equipment becomes stuck in a conduit such that it cannot be removed without excavation, the Contractor is to notify the Superintendent immediately upon becoming aware of the problem.

The Contractor shall be responsible for removal of any trapped equipment and shall wear all risks and bear all costs associated with the removal of the equipment. The Contractor is permitted to use his own or subcontracted resources for excavation and breaking into the conduit to retrieve equipment. Any conduit damaged by this operation is to be reinstated to the satisfaction of the Superintendent and must be inspected by the Superintendent’s representative prior to being backfilled. The Contractor shall restore all surfaces to the satisfaction of the Superintendent.
**WPRC -W208.25  EXCAVATION**

Should excavation be necessary for any reason, it is to be carried out in accordance with Principals standard specifications. Particular attention is drawn to the following:

- Prior to the commencement of any excavation, the Contractor is to determine the location of any services in the vicinity of the proposed excavation. The Contractor shall take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service. If the Contractor damages a service the Contractor is to immediately contact the relevant authority or owner and arrange repairs to the satisfaction of the authority or owner. The Contractor is to obtain from the authority or owner a certificate stating that the repair has been carried out to their satisfaction. If the owner of the service cannot be determined the Contractor is to seek further advice from the Superintendent. All costs associated with the location and repair of services are to be borne by the Contractor.

- The Contractor is not to commence any excavation until all materials necessary to make the excavation safe are on site and available for use. This includes any necessary fencing and barriers as well as trench support systems.

- Excavation is to be kept to the minimum possible to allow efficient execution of the works.

- If excavation of bitumen, asphalt or concrete surfaces is involved the Contractor is to saw cut neat straight lines at the outer limits of the excavation. Any affected pavers, blocks or brick pavements shall be removed by hand, cleaned and set aside for later replacement.

- The Contractor is to adequately support all excavations at the work proceeds to meet the requirements of the Workcover Authority.

- The Contractor is to promptly remove and dispose of excavated material which is not required for reuse. The material is to be disposed of at a Principal approved tipping site.

- The Contractor is to backfill in accordance with the Principals standard specifications

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**WPRC -W208.26  RESTORATION**

The Contractor shall restore all public and private property to a condition equal to that before work on site began. Restoration where possible should be carried out prior to leaving the site.

All restoration works shall be completed within two (2) weeks of the completion of works.

Restoration of pavements is to be in accordance with the appropriate Principals standard specification to suit original material.

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**WPRC -W208.27  SWABBING**

Swabbing of constructed pipelines shall be undertaken in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.
WPRC -W208.28 HYDROSTATIC PRESSURE TESTING

All replacement pipelines greater than 20m in length shall be hydrostatically pressure tested after any concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.

Hydrostatic pressure testing shall be conducted in accordance with the method detailed in Clause 2.13 of WSA01-2004.

The test pressure shall be as per WSA03-2011 and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory is all the following are achieved:
   (a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
   (b) there is no visible leakage; and,
   (c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

WPRC -W208.29 DISINFECTION

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all replacement pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.
A certificate of Practical Completion will not be issued by the Superintendent until the Superintendent is satisfied that the work complies with the requirements of this Specification and the Contract in all respects (subject to such minor omissions as may be accepted by the Superintendent) and that the Contractor has carried out all of his obligations under the Contract except as regards his obligations during the Defects Liability Period.
APPENDIX A – HYDROSTATIC TESTING FORMS

Part A - Notification of Hydrostatic Testing by Contractor

CONTRACTOR .................................................................

CONTRACT .................................................................

Proposed Hydrostatic Testing

<table>
<thead>
<tr>
<th>Section</th>
<th>Start Chainage</th>
<th>End Chainage</th>
<th>Size (DN)</th>
<th>Material</th>
<th>Date and Time of Test</th>
</tr>
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<tbody>
<tr>
<td>A</td>
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Contractor ............................................................................................................................ (Signature)

............................................................................................................................ (Date)

Received by - Superintendent .................................................................................................. (Signature)

............................................................................................................................ (Date)

- Principal .................................................................................................................. (Signature)

............................................................................................................................ (Date)

CONTRACTOR

CONTRACT

Results of Hydrostatic Testing – PE Testing as per WSA01-2004 Section 2.13

SECTION

TEST DATE

WATER TEMPERATURE

TEST START TIME

TEST FINISH TIME

TEST PRESSURE

<table>
<thead>
<tr>
<th>Section</th>
<th>1 hour</th>
<th>2 hours</th>
<th>3 hours</th>
<th>4 hours</th>
<th>5 hours</th>
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</thead>
<tbody>
<tr>
<td>Make-up water added L (ΔV)</td>
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</table>

Permitted make-up water is determined by the formula \( V_{all} (L/h) = 0.14LDH \) where \( L = \) pipeline length (km), \( D = \) pipeline diameter (m) and \( H = \) average test head over pipeline (m).

ALLOWABLE MAKE-UP \( (V_{all}) \) .................................

\[ 0.55 \times \Delta V_{(3h-2h)} \text{ at } 3^{rd} \text{ hour} + \text{ALLOWABLE MAKE-UP } (V_{all}) \] .................................

\[ \Delta V_{(5h-4h)} \text{ at } 5^{th} \text{ hour} \] .................................

PASS/FAIL .................................

Witnessed by Superintendent.................................................................(Signature)

...........................................................................................................Date

Contractor ...........................................................................................................(Signature)

...........................................................................................................Date
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W209

REHABILITATION OF WATER MAINS - LINING
TECHNICAL SCHEDULE WPRC-W209 – REHABILITATION OF WATER MAINS - LINING

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WPRC-W209: REHABILITATION OF WATER MAINS - LINING

WPRC -W209.1 SCOPE

This Specification applies to the rehabilitation of existing water supply mains by the insertion of a suitable internal lining system to re-establish the integrity of the water main with minimal excavation (pipe relining.)

The rehabilitated pipe will have an internal diameter smaller than the pre-existing pipe, however this should be minimised as far as possible.

All live connections and property services are to be reinstated.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W209.2, unless specified otherwise herein.

WPRC -W209.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply unless noted otherwise. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

Replacement pipe shall be designed in accordance with the following Codes, Standards and Manuals, where relevant:

AS 2566 Buried Flexible Pipelines
AS 4020 Testing of Products for Use in Contact with Drinking Water

Works shall also comply with the current versions all relevant Australian Standards.

Water Services Association of Australia Standards

WSA01 Polyethylene Pipeline Code
WSA02 Water Supply Code of Australia
WSA05 Conduit Inspection and Reporting Code of Australia

WPRC -W209.3 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.
WPRC -W209.4      WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be
demed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-
Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site
Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall
submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and
Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the
duration of the Contract.

The Contractor's Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security
  matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

The Contractor is to conform to the requirements of the Work Health and Safety Act 2011.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum
standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any
injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to
the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if
they were his own personnel.
Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC -W209.5 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for *Traffic Control at Work Sites, AS1742, SAA HB81* and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

**WPRC -W209.6 PROTECTION OF THE ENVIRONMENT**

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

**WPRC -W209.7 NOISE**

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.
WPRC -W209.8  CUSTOMER NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper (and electronic media?) indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.

WPRC -W209.9  ENTRY TO PRIVATE PROPERTY

If entry to private property is required then the Contractor is to advise the property owner a minimum of two (2) clear working days in advance of the work proceeding. This advice is to be in the form of a signed letter which the Principal will supply in this regard. The Contractor shall be responsible for duplication and all associated costs. In addition to this written advice, the Contractor shall also verbally advise the resident on the day that the work is programmed and the work is about to commence. If there is not a resident in attendance at the time the Contractor’s personnel have arrived on site, then the Contractor shall proceed with the work provided that the letter of notification had been previously sent the required timeframe in advance of entry to the property.

On completion of work the Contractor shall leave a Calling Card in the letterbox of the property. The Principal shall provide to the Contractor the necessary cards. The Contractor is responsible for all duplication and associated costs.

The Contractor shall not, without prior approval of the Superintendent, enter private property outside the hours of 8.00am to 5.00pm Monday to Friday or at any time on Public Holidays.

WPRC -W209.10  CUSTOMER COMPLAINTS

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, and no later than the close of business (5:00 PM) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.
The Contractor shall be the point of contact for all customer or resident queries and complaints associated with works carried out under this contract. Queries and complaints shall be resolved promptly by the Contractor and as a minimum:

- The Contractor shall respond to the customer within 24 hours of receiving a complaint/query.
- The Contractor shall resolve all complaints within 5 working days.
- Where a complaint cannot be resolved within 5 working days, the Contractor shall notify the Superintendent of the issue, progress and expected date of resolution.
- If a complaint cannot be resolved within 7 working days, the Superintendent may without any further notice undertake to resolve the complaint at the Contractor’s cost.

The Contractor must notify the Superintendent if any customer complaints are received by the Contractor. Notification must be received by the Superintendent as soon as practicable, and no later than the close of business (5:00pm) on the day of receipt of the complaint. Wherever possible the Principal wishes to be notified by the Contractor prior to receiving complaints directly from a customer.

The Contractor shall keep a record of all customer contact relating to complaints, queries and out of hours access including date/time, name/address of contact, method of contact, issue raised and actions taken.

WPRC -W209.11 DAMAGE TO PROPERTY

The Contractor is entirely responsible for any damage caused to any property, including any existing utility services by its operations. The Contractor shall immediately carry out or arrange for any repairs and pay for the full cost of such repairs and any associated damages.

Damage shall not be caused in order to obtain access to a property. Access to a property must be by an appropriate route such as driveway or path where these exist.

Where the safety and access to an existing utility service is likely to be endangered, the Contractor shall request the attendance of an officer of the utility concerned, to advise on precautions to be taken, and shall take such actions as may be recommended by that officer.

WPRC -W209.12 DEALING WITH DOGS

Dogs can inflict serious injury and, in some cases, death. This procedure details the general procedure when dealing with dogs.

Dogs tend to be protective of both people and property and may turn savage when confronted.

Where dogs are present on private property, the Contractor shall arrange for the dog owner to restrain the dog. This shall comprise of having the dog tied or put in an area from which it cannot escape whilst works are carried out. Do not accept the owner’s advice that “it will be OK”.
Where the dog owner is not present to be able to restrain the dog on private property, the Contractor shall leave a Customer Notification Card and defer works until the owner is available. If a suitable time cannot be arranged with the dog owner, the Contractor shall refer the matter to the Superintendent for direction.

Where the owner/controller of the dog is available but is unwilling or unable to control the dog, or the dog is uncontrolled on public property, the Contractor shall report this to the Superintendent who will arrange for the Principal’s Animal and Ranger Services to assist.

**WPRC -W209.13 WATER SUPPLY**

Water is available for the purposes of this contract from Principal hydrants at no charge to the Contractor for water used. The Contractor may supply its own Council approved metered standpipe fitted with a reduced pressure zone (RPZ) backflow device or he may hire a standpipe and RPZ backflow prevention valve from the Principal for use with this contract. The RPZ valve is to be fitted whenever the standpipe is in use.

The Superintendent may direct where standpipes are to be affixed.

The Contractor is to take all due care whilst using standpipes to ensure that no damage is done to the hydrant or main. The cost of repairing any damage to any of the Principal's assets shall be borne by the Contractor.

**WPRC -W209.14 ISOLATION OF WATER MAINS**

The Principal shall operate valves to isolate the subject water main prior to the cleaning operation and shall operate valves to recharge the subject water main at the completion of the cleaning operation.

Any single incidence of water supply interruption under this contract is not to exceed six (6) hours, and is not to occur outside the hours of 9.00AM to 3.00PM Monday to Friday. The Contractor shall implement a temporary water supply system or other approved approach to limit any disruption to the water supply to customers to 6 hours.

**WPRC -W209.15 PROVISION OF INFORMATION TO THE CONTRACTOR**

The Principal will, where available, provide the Contractor with information regarding the water mains selected for rehabilitation, including:

a) Location of the water main (Plan or Map)

b) Approximate length of the water main

c) Water main material type

d) Diameter of water main

e) Approximate number of property branches to be reinstated to new lined water main
**WPRC-W209.16  LOCATION OF WATER MAINS**

Recorded water main and surface fitting locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the locating the water main and surface fittings on site.

If work cannot be undertaken by the Contractor due to failure to locate a surface fitting after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the surface fitting to be located by the Principal’s staff. If the Principal’s staff locate the fitting within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

**WPRC-W209.17  DESIGN AND SUPPLY OF LINER**

The liner to be installed to rehabilitate the water main shall be designed based on either a fully deteriorated or partially deteriorated host pipe.

The liner shall be designed to:
- a) Have a minimum pressure rating of PN10 or greater where required by the design head of the individual water main being lined
- b) Withstand all loadings applied to the existing water main
- c) Minimise cross-sectional area loss for water flow
- d) Have a certified minimum service life of 50 years

The lining shall be designed as a flexible pipe and be capable of supporting all imposed loading. Each liner shall be designed to satisfy the critical performance criteria of:
- Vertical deflection
- Strength
- Buckling

The liner shall be comprised of materials which are resistant to chemical, biological and mechanical degradation by domestic and industrial water and corrosive soils and substances generally. The liner shall also prevent the intrusion of tree roots through the lining.

The liner shall be suitable for use and contact with drinking water and be certified as being compliant with the requirements of AS 4020.

The liner thickness shall be calculated by the Contractor to suit the specific job and shall take account of design internal pressure, ground water pressures, soil pressure and structural requirements. The lining system shall not reduce the internal diameter of the existing pipe by more than 10% in lines 500mm and smaller, nor more than 5% in lines greater than 500 mm diameter.
The Contractor shall submit the following information:

- **a)** Full details of the liner material including its physical and chemical properties and standards governing the manufacture of the liner material.
- **b)** Full details of methods of liner manufacture, including standards governing the liner manufacture.
- **c)** Certification of compliance of liner with AS 4020 and suitability for contact with drinking water.
- **d)** Full details on methods of liner installation including methods of any temporary supply where required.
- **e)** List of any defects inherent in the proposed lining system. (Inherent defects are those that commonly occur with the lining system where it is not possible or commercially practical to eliminate because of the inherent nature of the system).
- **f)** Full details of methods of reinstatement of junctions and property connection branch water mains. The Contractor should also provide a procedure for cutting a new connection into the rehabilitated pipeline, and for sealing the gap between the host pipe and the liner at the point of connection, if required.
- **g)** Full details of liner finishing and effective connections at the ends.

**WPRC -W209.18 DESIGN LOADS**

The loads used in the design of a liner shall be the most severe of any combination of earth pressure, ground water hydrostatic pressure, traffic loading and internal hydrostatic pressure.

Vertical earth pressure shall be calculated as follows:

- Where cover to a deteriorated pipeline is less than 3m OR less than 10 times its nominal diameter – weight of the full height of the prism of soil above the host pipe, without reduction for trench effects;
- Where cover to the deteriorated pipeline is greater than 3m AND greater than 10 times its nominal diameter – calculated in accordance with Clause C4.3 AS2566.1:1998). Trench material shall be assumed to be soft clay;
- The maximum depth of cover for each pipe shall be used to calculate the earth pressure for that length. The soil unit weight shall be taken as at least 20kN/m³. As this is usually the weight assumed for saturated clay, it shall be assumed to include groundwater for the purposes of calculating buckling loads.

Traffic surcharge loads shall be calculated in accordance with Clause 4.7 of AS2566.1 for the following types of traffic loadings:

- Type A Main Road: Multiple adjacent lanes of Standard T44 or Standard W7 wheel loads;
- Type B Light Road: Single lane of Standard T44 or Standard W7 wheel loads;
- Type C Field Load: 60% of light road loading.

For each liner, the type of traffic load used for liner design shall be explained in terms of assumptions and communication with the relevant authority. Full consideration of future traffic flows shall also be taken into account.
Hydrostatic loading shall be calculated assuming an internal pressure from water and external hydrostatic loading shall be calculated assuming a water table located at the ground surface, acting in isolation from, or in combination with, any other loads. Hydrostatic loading internally at the full design head for the pipeline shall be calculated, acting in isolation from or in combination with any other loads.

**Vertical Deflection**

The liner shall be designed with a long term deflection limit of 6% calculated in accordance with Clause 5.2 of AS2566.1:1998.

The total design load shall be the maximum produced by the combination of vertical earth pressure and traffic surcharge load. The effect of groundwater hydrostatic pressure and internal surcharge shall be ignored.

Liner long term Modulus of Elasticity used in calculating long term ring-bending stiffness of the pipe in equation 5.2(2) of AS2566.1:1998 shall be as submitted by the Contractor in the Schedule of Technical Data.

The value of soil modulus (E') used in equation 5.2(2) of AS2566.1 shall be taken as 5.0 MPa unless approved otherwise by the Superintendent.

**Design for Strength**

The liner shall be designed with a long term flexural strain developed in the wall of the liner under the load or load combination not exceeding the permissible value appropriate for the liner material. This shall be detailed in the Schedule of Technical Data.

The long term flexural strain shall be calculated in accordance with Clause 5.3.1 of AS2566.1:1998.

**Design for Buckling Resistance**

The total imposed buckling pressure shall be the maximum produced by the combination of vertical earth pressure, groundwater hydrostatic pressure and traffic surcharge load in accordance with Section 5.4. AS2566.1:1998. A soil load of not less than 20kN/m³ shall be assumed. This load should be considered to include groundwater. The effect of internal surcharge shall be ignored.

The total imposed buckling pressure shall be less than the allowable buckling pressure calculated in accordance with equation 5.4(5) of AS2566.1:1998. The factor of safety shall be 2.5.

**Local Buckling**

In addition to the requirements of Section 5 of AS2566.1, the liner shall have a minimum ring bending stiffness in accordance with the local buckling requirements for an intact pipe. It shall be designed to support the external hydrostatic load imposed from a groundwater table located at the ground surface.

The design shall be based on the buckling strength of the liner taking into account the enhancement provided by the existing pipe.
WPRC -W209.19  MANUFACTURE OF LINER

The Contractor shall manufacture the liner in accordance with the material, methods and equipment proposed by the Contractor in its Tender and accepted by the Principal.

The liner shall be designed and fabricated in a manner that, when installed, will neatly fit the internal circumference and length of the pipe being lined. Where lining technology requires, suitable allowance shall be provided for longitudinal and circumferential stretching of the lining during installation.

The Contractor shall be responsible for measuring the internal diameter of the existing pipeline at both ends of the line prior to fabrication, to ensure that proper fit is achieved.

The Contractor shall nominate the minimum standards of liner internal surface finishes observed or measured after the liner installation, which the Contractor would consider as the minimum requirement in meeting the Colebrook-White coefficient of friction, that being not more than 1.0mm. These nominated minimum standards may take the form of the maximum allowable number of visible wrinkles or ridges per linear metre of liner, etc.

In the event that the liner internal surface finishes do not meet the minimum standards nominated by the Contractor, the liner shall be repaired and defects/irregularities removed by using methods approved by the Superintendent and to the satisfaction of the Superintendent. The cost of such liner repair work shall be borne by the Contractor.

WPRC -W209.20  PREPARATION OF WATER MAINS FOR LINING

The Contractor shall clean the water main line prior to insertion of the liner to ensure precise installation of the lining system. The cleaning method employed must not cause further damage to the line. Foreign matter, silt, encrustation and similar must be removed from the line to the satisfaction of the Superintendent and the requirements of the lining method to be used.

Four (4) cleaning runs are to be allowed for in the tendered rate and a CCTV camera is to be used to verify the effectiveness of the cleaning procedure. One cleaning run constitutes cleaning a section upstream and downstream. The Contractor shall ensure that a high pressure water jet cleaning system is used as a minimum, to clean existing water main lines.

Debris and other matter cleaned from the water mains shall be removed appropriately and legally. The Contractor shall not leave debris and other matter on site. All materials resulting from the cleaning operation shall be trapped in filter socks at the downstream end of the pipes. The Contractor shall remove all trapped materials and dispose of them in a manner acceptable to the Environmental Protection Authority and other relevant local authorities. All costs associated with removal and disposal of the debris and other matter shall be borne totally by the Contractor.
CCTV inspection shall be carried out by the Contractor prior to installation of liners to establish that the pipe is clean and ready to receive the liner.

The Contractor shall confirm which property connections are live prior to lining.

**WPRC -W209.21 INSTALLATION OF LINER**

**Liner Installation**

All Work shall be carried out under the technical direction of a qualified and experienced person who has had suitable training and experience in the installation of the liner, nominated by the Contractor in its Tender and accepted by the Principal.

The Contractor shall have submitted with its Tender full details of the installation procedure and the Installation Quality Plan for the lining to the Superintendent for approval based on the proposal made in its Tender. These details shall be compatible with the liner design. The Contractor shall provide all the equipment for the safety of its workforce and for installing the lining and shall install the lining in accordance with the procedures approved by the Superintendent.

Where applicable the Contractor shall:
- install the liner in a continuous operation.
- ensure that the liners are not over stressed and that the inner and outer surface layer is not damaged.
- transport the liners and position them inside the water main conduit to ensure that damage to the inner and outer surface layer is prevented.
- joint liners utilising a suitable jointing system.
- construct liner transition connection at pipe ends using methods approved by the Superintendent.

Where required by the lining method, the liners shall be transported to Site under controlled environment conditions. The Contractor shall decide when to transport the liners to Site and when to commence liner insertion with regard to the weather conditions.

**Standard of Finish**

The liner shall have a surface finish free of all defects such as foreign inclusions, dry spots, air bubbles, pinholes, pimples and delamination which may cause obstruction to flow or adversely affect the hydraulic capacity of the water main. The liner shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to the inside of the lined pipe.

Facilities including closed circuit television cameras and access shall be made available at all time by the Contractor to the Superintendent to enable inspections of the liner to be made. Where the Superintendent determines that any defects shall adversely affect the integrity, structural strength of the liner, or hydraulic capacity of the lined water main, then such defects shall be repaired or the liner replaced at the Contractor's expense.
WPRC -W209.22  CONNECTION TO EXISTING LINES

The Contractor shall connect the new liner to existing water mains at each end of the job and at all live property connections in accordance with Principal’s standard specifications using approved fittings and practices, to the satisfaction of the Superintendent.

WPRC -W209.23  RE-ESTABLISHMENT OF EXISTING FITTINGS

The Contractor shall re-establish all pre-existing hydrants, valves and other fittings on the new MDPE pipe in accordance with the Principals’ standard specifications using approved fittings and practices, to the satisfaction of the Superintendent.

WPRC -W209.24  EXCAVATION

Should excavation be necessary for any reason, it is to be carried out in accordance with Principals standard specifications. Particular attention is drawn to the following:

- Prior to the commencement of any excavation, the Contractor is to determine the location of any services in the vicinity of the proposed excavation. The Contractor shall take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service. If the Contractor damages a service the Contractor is to immediately contact the relevant authority or owner and arrange repairs to the satisfaction of the authority or owner. The Contractor is to obtain from the authority or owner a certificate stating that the repair has been carried out to their satisfaction. If the owner of the service cannot be determined the Contractor is seek further advice from the Superintendent. All costs associated with the location and repair of services are to be borne by the Contractor.
- The Contractor is not to commence any excavation until all materials necessary to make the excavation safe are on site and available for use. This includes any necessary fencing and barriers as well as trench support systems.
- Excavation is to be kept to the minimum possible to allow efficient execution of the works.
- If excavation of bitumen, asphalt or concrete surfaces is involved the Contractor is to saw cut neat straight lines at the outer limits of the excavation. Any affected pavers, blocks or brick pavements shall be removed by hand, cleaned and set aside for later replacement.
- The Contractor is to adequately support all excavations at the work proceeds to meet the requirements of the Workcover Authority.
- The Contractor is to promptly remove and dispose of excavated material which is not required for reuse. The material is to be disposed of at a Principal approved tipping site.
- The Contractor is to backfill in accordance with the Principals standard specifications.
WPRC -W209.25  ADDITIONAL ACTIVITIES INCLUDED IN SCOPE

The following activities are deemed to be included in the scope of work:

- Removal of any obstructions necessary to provide access to any water main and replacement if necessary following completion of the work.
- Locating, uncovering and 'freeing' of all surface fitting covers such that they are accessible for the carrying out of the works (refer to Clause WPRC-W209.16 if any surface fitting cannot be located after all reasonable effort).
- Rebuilding of surface fittings where removal of fitting lid, surround or components are necessary during any part of the contract.
- All existing lines adjacent to the line to be replaced are to be plugged to prevent debris, runoff, etc. from entering.

WPRC -W209.26  RESTORATION

The Contractor shall restore all public and private property to a condition equal to that before work on site began. Restoration where possible should be carried out prior to leaving the site.

All restoration works shall be completed within two (2) weeks of the completion of works.

Restoration of pavements is to be in accordance with the appropriate Principals standard specification to suit original material.

WPRC -W209.27  TESTING

At the Superintendent’s discretion, the Contractor may be required to carry out inspections and testing of any rehabilitated water main. The Contractor shall provide all labour, materials and equipment required for the testing, inspection and monitoring, including pressure gauges and thermostats certified by an approved authority, and shall prepare and supply all necessary test pieces.

Sample test pieces shall either be cut from the excess sections of the fully installed liner as part of the Works for this Contract, or from a liner installed and cured in similar conditions to those installed for the Contract. The samples shall be referenced and either tested as set out below or stored until the end of the Defect Liability Period.

The Contractor shall give the Superintendent at least three (3) working days notice of the date, time and place of the performance tests and provide all facilities required to satisfactorily complete the tests.

A NATA registered laboratory shall carry out all tests, unless otherwise approved by the Superintendent.

Alternative overseas or Australian Standards to those listed may be considered acceptable by the Superintendent for testing purposes provided that the test method specified will provide an accurate measure of the required physical property or aspect of the installation quality.
Hydrostatic Pressure Testing

All relined pipelines greater than 20m in length shall be hydrostatically pressure tested after any concrete thrust restraint curing times have elapsed. Hydrostatic pressure testing shall be undertaken in accordance with WSA03-2011 Clause 19.4.

The Contractor shall provide the Superintendent with a minimum of 3 clear working days written notice prior to carrying out hydrostatic pressure testing. This notice must be in writing and specify the pipeline sections to be tested, as well as the time, date and location of the test and equipment to be used (refer Appendix A for an example notification form).

Pressure testing shall not be carried out during wet weather unless otherwise approved by the Superintendent.

Before testing a pipeline section, it shall be cleaned to the satisfaction of the Superintendent and filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. In order to achieve conditions as stable as possible for testing by allowing for absorption, movement of the pipeline and escape of entrapped air, the section shall be kept full of water for a period of not less than 24 hours prior to the commencement of the pressure testing.

Hydrostatic pressure testing shall be conducted in accordance with the method detailed in Clause 2.13 of WSA01-2004.

The test pressure shall be as per WSA03-2011 and shall be no lower than 1200 kPa and no higher than the pressure rating of the pipeline system components including pipes, valves, fittings and thrust blocks.

The pressure testing of a section shall be considered to be satisfactory if all the following are achieved:

(a) there is no failure of any thrust block, pipe, fitting, valve, joint or any other pipeline component;
(b) there is no visible leakage; and,
(c) The quantity of make-up water necessary to maintain the test pressure does not exceed the allowable quantity of make-up water.

Any failure, defect, visible leakage and/or excessive leakage rate, which is detected during the pressure testing of the pipeline or during the Defects Liability Period shall be made good by the Contractor at their expense.

A testing report similar to that shown in Appendix A shall be prepared and signed off by the Contractor and Superintendent witnessing the tests. This report shall be submitted to the Superintendent within 5 working days of the completion of testing.

WPRC -W209.28 SWABBING

Swabbing of all relined pipelines shall be undertaken in accordance with WSA03-2011 clause 18 unless otherwise approved by the Superintendent.
WPRC -W209.29  DISINFECTION

Following a satisfactory hydrostatic pressure test and where required by the Project Specification or Superintendent, the Contractor shall disinfect all replacement pipelines and existing mains taken out of service during construction in accordance with WSA03-2011 Clause 20.

WPRC -W209.30  PRACTICAL COMPLETION

A certificate of Practical Completion will not be issued by the Superintendent until the Superintendent is satisfied that the work complies with the requirements of this Specification and the Contract in all respects (subject to such minor omissions as may be accepted by the Superintendent) and that the Contractor has carried out all of his obligations under the Contract except as regards his obligations during the Defects Liability Period.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W401

WATER AND SEWER VALVE EXERCISING
### TECHNICAL SCHEDULE WPRC-W102 – CONSTRUCTION OF WATER RETICULATION

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WPRC-W401: WATER AND SEWER VALVE EXERCISING

WPRC -W401.1 SCOPE

The Principal maintains a valve maintenance and exercising program for existing water and sewer valves located throughout the Principal’s systems. This program generally comprises the following four components:

- Locate valves;
- Fully exercise valves;
- Maintain detailed valve records; and
- Schedule and perform necessary repairs.

WPRC -W401.2 REFERENCED DOCUMENTS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 2638  Cast iron sluice valves for waterworks purposes

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA02  Sewerage Code of Australia
WSA03  Water Supply Code of Australia
N/A  WSAA Product Specifications

WPRC -W401.3 NOTIFICATION

If a water supply interruption is necessary under this contract the Principal shall be responsible for placing media advertisements advising affected customers according to the work program supplied by the Contractor.

The Contractor shall give the Superintendent seven (7) days notice of the proposed work so that the Principal can arrange notification of affected customers.

The Superintendent will also arrange for notices to be published in a local newspaper [and electronic media?] indicating the water mains to be cleaned, the anticipated start date and the likely duration of the cleaning.
WPRC -W401.4 LOCATION

Recorded valve locations will be shown on the plans supplied by the Principal. The Contractor is responsible for the locating the valves on site.

If work cannot be undertaken by the Contractor due to failure to locate a valve after all reasonable effort has been made by the Contractor, notification is to be given to the Superintendent who will then arrange for the valve to be located by the Principal’s staff. If the Principal’s staff locate the valve within 2m and less than 300mm below the surface, the Principal reserves the right to charge the Contractor a fee to cover the Principal’s staff time for the location works.

WPRC -W401.5 EQUIPMENT

The Contractor shall advise the make, model, year and operating system version for any hydraulic valve turning equipment proposed to be used in their tender submission or to the Superintendent prior to commencement of work. All equipment used shall comply with all relevant Statutory Requirements.

WPRC -W401.6 LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

WPRC -W401.7 WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor’s employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.
The Contractor’s Safety Plan shall have included, but not necessarily be limited to:

- Safety Inductions
- Identification and Accountability of personnel having specific responsibilities for safety and security matters
- Safety Procedures (including Confined Space Entry and Fall Protection)
- Accident and loss reporting
- Safety Equipment
- Statutory requirements
- Safe working incentives and leadership
- Occupational health and hygiene
- Fire prevention
- Storage and issue of materials
- Confined Space Entry procedures, with valid confined space permits
- Fall from heights procedures
- Emergency procedures and contingency plans
- Safety disputes procedures

The Contractor is to conform to the requirements of the Work Health and Safety Act 2011.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC -W401.8 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.
The Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for Traffic Control at Work Sites, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

WPRC -W401.9 PROCEDURE

Valve exercising should generally follow the procedure below:

1. Locate valve;
2. Notify residents (as required);
3. Check the area for potential hazards and implement needed controls;
4. Establish traffic control as necessary;
5. Photograph the location, identifying the condition of the site;
6. Remove the cover;
7. Clean valve surface cover box/valve chamber and riser as necessary to inspect valve;
8. Exercise valve:
   • Verify the direction for turning the valve to the Closed and Open positions.
   • Unless known otherwise assume the valve is in the full Open position. Record starting position.
   • Begin Closing Valve Slowly, increasing torque as necessary to achieve movement (without exceeding the pre-determined Maximum Torque). Torque to be reduced immediately following initial movement to the lowest force required to continue moving the valve. **If the valve fails to turn at the torque limit, the exercise process is to stop immediately.**
   • Count the number of turns necessary to achieve the full Closed Position.
   • Begin Opening Valve Slowly, increasing torque as necessary to achieve movement (without exceeding the pre-determined Maximum Torque).
   • Count the number of turns necessary to achieve the full Open Position.
   • Repeat the Open to Close to Open cycle a minimum of three (3) times, or until the number of turns necessary to open or close the valve does not change.
   • Record the number of Turns, Cycles, and Maximum Torque applied.
• If there is a bypass valve it is to be exercised first. Should the bypass valve not operate, the main valve should not be exercised to ensure it does not become hydraulically locked in the closed position.

9. Photograph the valve if possible;
10. Record the valve dimensions (where possible), condition of the valve, necessary maintenance and other pertinent information;
11. Replace cover;
12. Prior to departing, evaluate the location for hazards to people, property, or environment, record findings; and
13. Mitigate any hazards discovered and/or initiate the actions necessary to eliminate those hazards.

WPRC -W401.10 VALVE EXERSIZING

Each valve should be operated through a full cycle and returned to its normal position on a schedule that is designed to prevent a build-up of tuberculation (rust formation in pipes as a result of corrosion) or other deposits that could render the valve inoperable or prevent a tight shutoff.

The valve should be operated through one complete operating cycle. If the stem action is tight as a result of buildup on the stem threads, the operation should be repeated until the opening and closing actions are smooth and free.

WPRC -W401.11 REPORTING

The number of turns required to complete the operation cycle should be recorded and compared with permanent installation records to ensure that full gate travel (i.e., it can be opened and closed) is maintained.

The Contractor shall record the following for each valve (where able to be obtained):

• Location;
• Make and model;
• Type of valve;
• Size of valve;
• No. of turns to close/open valve;
• Closing direction;
• General condition; and
• Maintenance and/or repairs required.
Based on the condition of the valve and installation, the Contractor shall identify any required maintenance activities and carry out these where directed by the Superintendent. Valve maintenance may include:

- Adjustment of valve covers and surrounds where the existing cover/surround does not finish flush with the surface in roadways, footpaths and paved surfaces and 25mm above the surface in other areas.
- Replacement of valve covers and surrounds where significantly damaged.
- Replacement or repair of any valve chambers where damage or deterioration is noted.
- Reinstallation of valve marking plate and/or marker post where an existing valve is not provided with these. Marker posts shall be white in colour and be either 100mm square reinforced concrete with 20mm chamfers, a powder coated metal post, recycled plastic post with recesses for marker plates of any other post approved by the Principal. When installed the top of the post shall be 1200mm above the ground and installed to a depth of at least 500mm into the ground.
- Replacement or provision of valve extension spindle (for buried valve) where valve spindle does not end within 300mm of ground surface.
- Replacement of valve stem seal.
- Retightening or replacement of flange bolts or flange gaskets.
- Replacement of entire valve where inoperable and unrepairable.

Any new stop valves installed shall be resilient seated sluice valves compliant with WSAA Product Specification WSA PS-261 and shall be:

- Manufactured in accordance with AS 2638.
- Minimum pressure class PN16.
- Suitable for buried service.
- Provided with external and internal fusion bonded epoxy coating in accordance with AS 4158.
- Anti-clockwise closing.
- Provided with an extension spindle compliant with WSAA Product Specification WSA PS-269 where required so that the valve can be operated by a key at a depth not exceeding 300mm from the ground surface.
TECHNICAL SCHEDULE

WPRC-W402

PERIODIC INSPECTION OF WATER AND SEWER SITES
### TECHNICAL SCHEDULE WPRC-W402 – PERIODIC INSPECTION OF WATER AND SEWER SITES

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WPRC -W402.1 SCOPE

This Specification applies to the periodic inspection of the Principal’s sites for key water supply and sewerage assets which would typically include treatment plants, pumping stations and reservoirs. The purpose of periodic inspection and recording is to monitor the performance and operation of the asset and identify any issues for maintenance or replacement.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W402.2, unless specified otherwise herein. Details of the sites to be inspected under this Contract will be outlined in the project specific Scope of Work document.

WPRC -W402.2 REFERENCED DOCUMENTS AND STANDARDS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 2865 Confined spaces

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA02 Gravity Sewerage Code of Australia
WSA03 Water Supply Code of Australia
WSA04 Sewage Pumping Station Code of Australia

WPRC -W402.3 EXTENT OF WORK

The inspection work shall typically be based on the following general process:

1. Contact the Principal’s site representative/s (where applicable) and arrange site access;
2. Visit site, report the Principal’s site representative and participate in any relevant site induction applicable for the particular site;
3. Inspect the nominated plant and equipment in accordance with the relevant inspection schedule and/or inspection pro-formas;
4. Advise the Principal’s site representative of any significant issue identified requiring urgent maintenance; and
5. Complete inspection recording and reporting.
The nature of the required inspections would typically be either of the following types, however other inspections may be specified by the Principal:

- Asset Condition Assessment
- Operational Inspection

**WPRC -W402.4 ASSET CONDITION ASSESSMENT**

The Contractor shall undertake an annual conditions assessment for the nominated sites and any additional plant and equipment specified. Unless specified otherwise, the Contractor shall undertake the condition assessment every 12 months from the initial assessment. The aim of the condition assessment is to comprehensively identify and quantify the following:

- General condition of the site and each of its components;
- Deficiencies that need to be attended to immediately to maintain the asset in an operable condition and meet statutory requirements;
- Major plant or equipment replacements, modifications or additions that would not normally form part of scheduled maintenance, but are required to be carried out within the next 12-18 months for the asset to be in a condition consistent with the requirements for proper operation;
- Replacements, modifications or additions normally part of preventative maintenance which are considered necessary over the next 10 years to keep the asset in a condition consistent with the requirements for proper operation.

The Principal has the following approved condition definitions for its Asset Management System. This should be referred to and adopted in the reporting of the condition of assets:

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<td>Very Poor</td>
<td>Urgent renewal / upgrading required</td>
</tr>
<tr>
<td>4</td>
<td>Poor</td>
<td>Renewal required</td>
</tr>
<tr>
<td>3</td>
<td>Average</td>
<td>Maintenance work required</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Only minor maintenance work required</td>
</tr>
<tr>
<td>1</td>
<td>Excellent</td>
<td>No work required</td>
</tr>
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**WPRC -W402.5 OPERATIONAL INSPECTION**

Regular operational inspections are carried out to confirm the asset is functioning correctly and to test the contingency measures provided at the site.
Operational inspections are typically based on Failure Modes Effects and Criticality Analysis (FMECA) principals, which are used to assess the requirements for both reactive and preventative Maintenance. Pro-forma checklists for regular operational inspections are based on these considering the following parameters:

- The function for each major asset component.
- All functional failure modes.
- The effects of each functional failure at a local and system level along with any potential impacts that the failure could have.
- How each failure mode could be detected.
- The reactive maintenance that is required to rectify a failure.
- The preventative maintenance activities to be carried out to minimise failures.

The Contractor shall undertake operational inspections based on the pro-formas provided by the Principal and at the frequency stated in the contract specific Scope of Work document.

**WPRC-W402.6 LABOUR, PLANT AND MATERIALS**

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

**WPRC-W402.7 WORKPLACE HEALTH & SAFETY (WHS)**

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.
The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

**WPRC -W402.8 SITE INDUCTION**

The Contractor may be required to undertake a Site Specific Induction for each site, performed by the Principal’s Representative. At the initiation of the Contract, the Contractor shall confirm which sites have a site induction requirement with the Principal. Where required, completion of the Site Specific Induction is a condition of the Contractor having access to the site.

**WPRC -W402.9 SITE ACCESS AND PARKING**

Site access and parking shall be restricted to the designated entries, loading zones and commercial parking spaces as provided to the general public. Most of the Principal’s sites have limited off street parking and it is the responsibility of the Contractor to familiarise itself with each site’s access restrictions. Where off street parking is available at the site, the Contractor shall ensure that vehicles are parked in the designated parking areas and not restrict access to any aspects of the site.

**WPRC -W402.10 TRAFFIC**

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

Where work is required to be undertaken in the vicinity of an existing roadway, the Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for *Traffic Control at Work Sites*, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.
Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

**WPRC -W402.11 NOISE**

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

**WPRC -W402.12 EQUIPMENT STUCK IN CONDUITS**

If any of the Contractor's equipment becomes stuck in a conduit such that it cannot be removed without excavation, the Contractor is to notify the Superintendent immediately upon becoming aware of the problem.

The Contractor shall be responsible for removal of any trapped equipment and shall wear all risks and bear all costs associated with the removal of the equipment. The Contractor is permitted to use his own or subcontracted resources for excavation and breaking into the conduit to retrieve equipment. Any conduit damaged by this operation is to be reinstated to the satisfaction of the Superintendent and must be inspected by the Superintendent's representative prior to being backfilled. The Contractor shall restore all surfaces to the satisfaction of the Superintendent.

**WPRC -W402.13 RECORDING AND REPORTING**

The Contractor shall record details of the inspection on the report pro-formas. Where provided by the Principal prior to the inspection, the Principal's pro-formas shall be used. Where pro-formas are not provided by the Principal, the Contractor shall provide suitable pro-formas for recording the inspection and obtain the Superintendent’s approval to the use of these prior to the commencement of the inspection.

In addition to the written report, the Contractor shall also prepare and provide still photographs showing the condition of key components covered by the inspection.

Upon completion of the inspections a detailed report on the site is to be presented to the Superintendent including still photographs and completed pro formas.
WESTERN PLAINS REGIONAL COUNCIL

Incorporating the former Dubbo City & Wellington councils

TECHNICAL SCHEDULE

WPRC-W403

CALIBRATION OF INSTRUMENTS
## TECHNICAL SCHEDULE WPRC-W403 – CALIBRATION OF INSTRUMENTS

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WPRC-W403: CALIBRATION OF INSTRUMENTS

WPRC-W403.1 SCOPE

This Specification applies to the calibration of instruments at the Principal’s water supply and sewerage assets. Regular calibration of instruments is required to ensure accurate measurements and correct operation of instrumentation.

The work required to be performed under this contract shall comply with the referenced documents in Clause WPRC-W403.2, unless specified otherwise herein.

Details of the instruments to be calibrated and their required frequency of calibration will be provided by the Principal.

WPRC-W403.2 REFERENCED DOCUMENTS AND STANDARDS

The following documents are referred to in this Specification. The latest version of the document including any published amendments shall apply. Where the Drawings or a project specific Specification are in conflict or inconsistent with these referenced documents or this Specification, then the details on the Drawings or project specific Specification shall apply.

Australian Standards

AS 1199 Sampling procedures for inspection by attributes
AS 2865 Confined spaces
AS 3565.4 Meters for water supply – in-service compliance testing

Works shall also comply with the current versions all other relevant Australian Standards where not specifically listed above.

Water Services Association of Australia Standards

WSA02 Gravity Sewerage Code of Australia
WSA03 Water Supply Code of Australia
WSA04 Sewage Pumping Station Code of Australia
WSA11 Compliance Testing of In-Service Water Meters Code of Practice

Other Standards and References

ISO/IEC 17025 General requirements for the competence of testing & calibration laboratories
LABOUR, PLANT AND MATERIALS

The Contractor shall provide at its own cost and expense all labour, materials, plant, tools and equipment necessary for the proper and complete performance of the Contract.

WORKPLACE HEALTH & SAFETY (WHS)

All costs associated with ensuring a safe work environment for the implementation of the Works shall be deemed to be included in the Tender price.

The Contractor shall ensure that in the performance of the Works, the Contractor's employees, Sub-Contractors and employees of such Sub-Contractors shall observe the statutory Safety Regulations and Site Conditions for Contractors.

Within 28 days of the Date of Acceptance and prior to the commencement of work, the Contractor shall submit to the Superintendent details of the Contractor’s WHS Management System including a Hazard and Risk Assessment and a Safety Plan specific to the Contract covering all of the Contractor’s activities for the duration of the Contract.

For Works in confined spaces the Contractor is to conform to the requirements of the Work Health and Safety Act 2011 and AS2865.

The Contractor shall provide medical treatment facilities and first-aid personnel to at least the minimum standards required by Workplace Health and Safety legislation.

As soon as possible following their occurrence, the Contractor shall report to the Superintendent any injuries likely to require medical treatment or involving lost time. In addition, the Contractor shall report to the Superintendent all injuries and near misses.

The Contractor shall manage and report all safety and security matters relating to his Sub-Contractors as if they were his own personnel.

Copies of the Safety Plan and records of all safety and security reporting over the duration of the Contract shall be held on site, readily accessible for inspection by the Superintendent. The Superintendent shall carry out, from time to time, ad-hoc audits of the Contractor’s safety systems on site. The Contractor shall attend all safety audits. The cost for participation in safety audits shall be included in the tender price.

SITE INDUCTION

The Contractor may be required to undertake a Site Specific Induction for each site, performed by the Principal’s Representative. At the initiation of the Contract, the Contractor shall confirm which sites have a site induction requirement with the Principal. Where required, completion of the Site Specific Induction is a condition of the Contractor having access to the site.
WPRC -W403.6 TRAFFIC

The Contractor shall carry out the work in such a manner as to minimise interference to the flow of traffic and pedestrians and shall comply with the standard Principal requirements.

Where work is required to be undertaken in the vicinity of an existing roadway, the Contractor shall develop and maintain a traffic management system that complies with the Road Traffic Authority manual for Traffic Control at Work Sites, AS1742, SAA HB81 and satisfies the requirements of the relevant road authorities. The Contractor shall submit the traffic management plan to relevant road authority and the Superintendent at least 7 days prior to the commencement of works.

Traffic control and public safety devices are to be provided by the Contractor. Methods and devices are to comply with Australian Standards, Workcover Authority requirements, Roads and Traffic Authority requirements, and any other relevant standards of practice.

The Contractor shall not divert traffic onto any temporary routes or close any roadway without prior written approval from the Superintendent.

Where traffic or parked vehicles make it impracticable or hazardous to carry out the work during normal working hours the Contractor may apply to the Superintendent for approval to perform the work outside of normal working hours.

WPRC -W403.7 PROTECTION OF THE ENVIRONMENT

All work shall be carried out in such a manner as to avoid nuisance and/or damage to the environment. The Contractor shall comply with the requirements of the conditions of approval imposed by Council and the NSW Environment Protection Authority. No variation in costs or extensions of time will be considered due to these requirements.

Toxic chemicals shall not be used without the prior written approval of the Superintendent.

WPRC -W403.8 NOISE

The Contractor shall conduct operations such that noise and other objectionable nuisance associated with the works are minimised. Where in the opinion of the Superintendent, operations are such as to warrant complaints on account of excessive noise or other nuisances, the Superintendent shall have the power to instruct that all work will cease until such time as the problem is rectified by the Contractor.

WPRC -W403.9 EQUIPMENT STUCK IN CONDUITS

If any of the Contractor's equipment becomes stuck in a conduit such that it cannot be removed without excavation, the Contractor is to notify the Superintendent immediately upon becoming aware of the problem.
The Contractor shall be responsible for removal of any trapped equipment and shall wear all risks and bear all costs associated with the removal of the equipment. The Contractor is permitted to use his own or subcontracted resources for excavation and breaking into the conduit to retrieve equipment. Any conduit damaged by this operation is to be reinstated to the satisfaction of the Superintendent and must be inspected by the Superintendent's representative prior to being backfilled. The Contractor shall restore all surfaces to the satisfaction of the Superintendent.

**WPRC-W403.10 QUALIFICATIONS**

Laboratory testing and calibration shall be performed by a recognised testing laboratory accredited in the field of ‘Measurement Science and Technology’.

Unless otherwise agreed by the Superintendent, all laboratory tests and field tests undertaken by the Constructor shall be performed by a Tester currently registered with the National Association of Testing Authorities (NATA) or equivalent authority for the class of tests being undertaken.

Other calibration and testing activities shall be undertaken by suitably qualified and experienced personnel in the particular activity being carried out.

**WPRC-W403.11 INSTRUMENT CALIBRATION**

Instrument calibration is one of the primary processes used to maintain instrument accuracy. Calibration is the process of configuring an instrument to provide a result for a sample within an acceptable range. Instrument calibration shall be undertaken by the Contractor in accordance with the instrument manufacturer’s recommendations and relevant standards.

Although the procedure varies for different instruments, the calibration process generally involves using the instrument to test samples of one or more known values. The results are used to establish a relationship between the measurement technique used by the instrument and the known values. These result can then be used to adjust the instrument to produce more accurate results in line with the known values. Following calibration the instrument can then provide more accurate results when samples of unknown values are tested.

The selected number of samples of known values to be tested as part of the calibration process shall be in accordance with the instrument manufacturer’s recommendations or applicable standards. All test samples of known values shall be stored according to the manufacturer’s instructions and shall be within any stated expiry date. The volume of any liquid/solutions used for the calibration shall be sufficient to cover both the probe and temperature sensor or as recommended by the manufacturer.

Prior to calibration, all instrument probes and cable connections shall be cleaned and the battery checked in accordance with the manufacturer’s recommendations. Failure to perform these steps can lead to erratic measurements.
If a multi-probe instrument is to be used, the Contractor shall program the instrument to display the parameters to be measured (e.g. temperature, pH, % dissolved oxygen, mg/L dissolved oxygen, L/s, etc.).

**WPRC -W403.12 POST CALIBRATION CHECK**

Following the initial calibration, the instrument’s calibration may drift during the measurement period. The amount of drift that occurred after collecting the measurements is required to be determined. This check is performed by using the instrument to make a measurement of a test sample of known value which if appropriate may be the same sample used to originally calibrate the instrument. The check measurement result shall then be compared to the initial calibration value and compared to the drift criteria or post calibration criteria described in the quality assurance plan or manufacturer’s instructions. If the check value is outside the acceptable criteria for drift, the measurement data recorded using that instrument shall be qualified.

**WPRC -W403.13 CALIBRATION FREQUENCY**

The frequency of calibration shall be as specified by the Principal, however as a minimum should be at least the frequency stated by the instrument manufacturer or relevant standard.

Where an instrument is not specifically required to be calibrated during the life of the instrument, as a minimum the instrument shall be checked for accuracy at least once per year.

**WPRC -W403.14 WATER METER COMPLIANCE TESTING**

Compliance testing for in-service water meters shall be undertaken in accordance with the WSAA Code of Practice WSA11. To determine the accuracy of a chosen meter population, a statistically valid sample of meters shall be selected and submitted for laboratory testing in accordance with WSA11, AS 3565 and AS1199.

**WPRC -W403.15 RECORDING AND REPORTING**

The results of calibration and testing of instruments shall be reported in a clear and unambiguous manner. Reports specific to the nature of testing and calibration activities and particular instruments involved shall be prepared by the Contractor and submitted to the Superintendent.
Reports shall include the following information:

- Name of calibration/testing organisation;
- Contract details of calibration/testing organisation;
- Accreditation scheme (e.g. NATA) where relevant to the calibration/testing organisation or laboratory;
- Accreditation number of the calibration/testing organisation where relevant;
- Identification of instrument including any asset/reference number, location, diameter and type or instrument;
- Details of the tests and/or calibration activities undertaken including procedure/method, standards and specific details such as date, flow, pressure, current or other relevant parameter;
- Results of the tests and/or calibration activities;
- Comments and observations; and
- Certification of calibration where relevant.

In addition, where an instrument has an equipment maintenance log, calibration details shall be recorded in this log. The logs should a record of both the frequency of calibration, as well as a mechanism of checking whether or not the calibration has drifted. Pre and post calibration values are recorded for each parameter where required.