CONTRACT NO. TEN/0510

Construction of
Fairymead Road Sewer Pump Station Flow Diversion

Technical Specification

Version 1.0
Date: 27 October 2018
# TABLE OF CONTENTS

## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GENERAL REQUIREMENTS</td>
</tr>
<tr>
<td>1.1</td>
<td>Relevant standards and specifications</td>
</tr>
<tr>
<td>2</td>
<td>TRAFFIC MANAGEMENT</td>
</tr>
<tr>
<td>2.1</td>
<td>Traffic Management Plan</td>
</tr>
<tr>
<td>2.2</td>
<td>Traffic Guidance Scheme</td>
</tr>
<tr>
<td>2.3</td>
<td>Scope</td>
</tr>
<tr>
<td>2.4</td>
<td>Implementation</td>
</tr>
<tr>
<td>2.5</td>
<td>Provision for Traffic</td>
</tr>
<tr>
<td>2.6</td>
<td>Restrictions to Traffic</td>
</tr>
<tr>
<td>2.7</td>
<td>Implementation of Controls</td>
</tr>
<tr>
<td>3</td>
<td>EARTHWORKS</td>
</tr>
<tr>
<td>3.1</td>
<td>Scope</td>
</tr>
<tr>
<td>3.2</td>
<td>Limitations on Clearing Operations</td>
</tr>
<tr>
<td>3.3</td>
<td>Stripping and Stockpiling of Topsoil for Re-use</td>
</tr>
<tr>
<td>3.4</td>
<td>Surplus Material</td>
</tr>
<tr>
<td>4</td>
<td>TRENCH EXCAVATION, EMBEDMENT, TRENCH BACKFILL AND DISPOSAL OF SPOIL</td>
</tr>
<tr>
<td>4.1</td>
<td>General</td>
</tr>
<tr>
<td>4.2</td>
<td>Allowable Horizontal Bearing Pressure</td>
</tr>
<tr>
<td>4.3</td>
<td>Embedment Material</td>
</tr>
<tr>
<td>4.4</td>
<td>Geotextile Material</td>
</tr>
<tr>
<td>4.5</td>
<td>Trench Fill Material</td>
</tr>
<tr>
<td>4.6</td>
<td>Type 7 Trench Support – Specific Requirements</td>
</tr>
<tr>
<td>4.7</td>
<td>Testing</td>
</tr>
<tr>
<td>5</td>
<td>DIRECTIONAL DRILLING</td>
</tr>
<tr>
<td>5.1</td>
<td>General</td>
</tr>
<tr>
<td>5.2</td>
<td>Installation</td>
</tr>
<tr>
<td>6</td>
<td>SEWERAGE PRESSURE MAINS – PIPEWORK BENDS AND FITTINGS</td>
</tr>
<tr>
<td>6.1</td>
<td>Materials and Storage</td>
</tr>
<tr>
<td>6.2</td>
<td>Installation</td>
</tr>
<tr>
<td>6.3</td>
<td>Testing</td>
</tr>
<tr>
<td>6.4</td>
<td>Construction Tolerances</td>
</tr>
<tr>
<td>7</td>
<td>RE-INSTATEMENT</td>
</tr>
<tr>
<td>7.1</td>
<td>Property Accesses – Unsealed</td>
</tr>
<tr>
<td>7.2</td>
<td>Property Accesses / Road Shoulder – Two Coat Bitumen Seal</td>
</tr>
<tr>
<td>7.3</td>
<td>Asphalt Footpath</td>
</tr>
</tbody>
</table>
ABBREVIATIONS

- **AHD** – Australian Height Datum
- **AS** – Australian Standard
- **ASS** – Acid Sulphate Soils
- **BRC** – Bundaberg Regional Council
- **EMP-C** – Environmental Management Plan – Construction
- **GCoC** – General Conditions of Contract
- **GDA** – Geocentric Datum of Australia
- **GPS** – Global Positioning System
- **GB** – General purpose Blended (cement)
- **GP** – General Purpose (cement)
- **ITPs** – Inspection Test Plans
- **LUA** – Land Use Agreement
- **MUTCD** – Manual of Uniform Traffic Control Devices
- **MH** – Maintenance Hole
- **NATA** – National Association of Testing Authorities
- **NCR** – Non Conformance Report
- **NZS** – New Zealand Standard
- **QMP** – Quality Management Plan
- **RPEQ** – Register Professional Engineer of Queensland
- **Std Dwg** – Standard Drawing
- **TGS** – Traffic Guidance Scheme
- **TMP** – Traffic Management Plan
- **TMR** – Queensland Department of Transport and Main Roads
- **TRSB** – Temporary Road Safety Barrier
- **VMS** – Variable Message Signs
- **WGS** – World Geodetic System
- **WUC** – Works Under Contract
- **WSA** – Water Services of Australia
1 GENERAL REQUIREMENTS

1.1 Relevant standards and specifications

All materials and workmanship incorporated into the Works shall comply with the requirements of the following standards and codes:

- WSA 02 – 2014 Version 3.1 – Gravity Sewerage Code of Australia
- WSA 03 – 2011 Version 3.1 – Water Supply Code of Australia
- WSA 07 – 2007 Version 1.1 – Pressure Sewerage Code of Australia
- AS 1111:2015 – ISO Metric hexagon bolts and screws
- AS 1112:2000 – ISO Metric hexagon nuts
- AS / NZS 1170.0:2002 – Structural design actions – General Principals
- AS 1237.1:2002 – Plain washers for metric bolts, screws and nuts for general purposes
- AS 1289.3.8.1:2006 – Methods of testing soils for engineering purposes – Soil classification tests – Dispersion – Determination of Emerson class number of a soil
- AS / NZS 1477:2006 – PVC pipes and fittings for pressure applications
- AS 1646:2007 – Elastomeric seals for waterworks purposes
- AS / NZS 2033:2008 – Installation of polyethylene pipe systems
- AS 2129:2000 – Flanges for pipes, valves and fittings
- AS / NZS 2280:2014 – Ductile iron pipes and fittings
- AS / NZS 2566.2:2002 – Buried flexible pipelines – Installation
- AS / NZS 2638.2:2011 – Gate valves for waterworks purposes – Resilient seated
- AS 3600:2009 – Concrete structures
- AS / NZS 4130:2009 – Polyethylene (PE) pipes for pressure applications
- AS / NZS 4158:2003 (R2015) – Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
- AS / NZS 4360:2004 – Risk management
- AS / NZS 4680:2006 – Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
- AS 6401:2013 – Knife gate valves for waterworks purposes

All materials shall be approved by the Superintendent prior to the incorporation into the Works. Within seven (7) days of commencing the relevant activity, the Contractor shall submit the required documentation to the Superintendent for review, to demonstrate that the proposed materials meet the minimum requirements outlined in the contract.
2 TRAFFIC MANAGEMENT

2.1 Traffic Management Plan

The Traffic Management Plan (TMP) shall outline how the Works are to be integrated into the operation of the road network. The outcome of the TMP shall describe how all road users will be accommodated throughout the duration of the Works and the impacts on both road users and the construction process.

No traffic re-arrangements shall be carried out until the Superintendent has indicated that the Contractor’s TMP is considered suitable for use.

2.1.1 Scope

The TMP shall:

a) Describe the proposed traffic arrangements which provide the necessary sequencing of the WUC while minimising disruption and confusion to road users, local traffic, public transport, emergency services, pedestrians and cyclists.

b) Describe how the construction work area shall be physically isolated from road users and provide details of how access to adjacent private properties and businesses shall be maintained.

c) Provide details of arrangements to be made for detouring traffic, where applicable.

d) Provide details of road closures and / or restrictions required to undertake the WUC.

e) Provide all Traffic Guidance Schemes required to undertake the WUC.

f) Identify arrangements for the management of oversize vehicle movements throughout the Site.

g) Provide details for the timely notification (minimum of 48 hours) and engagement of community in advance alterations to existing traffic conditions, and shall align with the proposed procedures and management techniques outlined in the Contractor’s Community Liaison Plan. The advice should include:

   i. The physical changes to the road
   ii. Expected delays and traffic impacts
   iii. Alternative route(s) that may be available
   iv. The names and details of the nominated out-of-hours representatives.

2.1.2 Implementation

The Contractor shall implement and monitor the effectiveness of the TMP in accordance with the Contract and the requirements outlined in the plan, and revise and update the plan where necessary.

2.2 Traffic Guidance Scheme

Each Traffic Guidance Scheme (TGS) shall show all the traffic control devices and their layouts on a plan, and shall be consistent with the Contractor’s approved TMP.

Where any change to existing traffic arrangements is proposed or where construction conflicts with normal traffic movements, the Contractor shall prepare a TGS which clearly details the revised traffic arrangements at all locations affected by the change or conflict. A separate TGS is required for each stage of the Works where changes are made to the traffic control devices.

2.3 Scope

All TGS’s shall be prepared by suitable qualified and experienced personnel and shall be in accordance with the Queensland Department of Transport and Main Roads Manual of Uniform Traffic Control Devices (MUTCD) Part 3 Works on Roads.

Approval of the TGS by the Superintendent is required prior to implementation and forms a construction Hold Point. All TGS shall be submitted to the Superintendent for review at least 14 days prior to the proposed implementation date.

The TGS shall show traffic control device layouts, but fully dimensioned and shall generally agree with the Contractor’s construction sequence and other requirements outlined in the Contract.

The TGS shall state the period for which the devices are to be in place (time and date) and the person who is responsible for installing, maintaining and removing them. Furthermore, the TGS shall identify the traffic control devices which are only to be in place during periods of actual work on the Site. Signs such as symbolic workers signs and speed limits, introduced due to reduced clearances to workers, should be covered or removed during periods when workers are no longer on Site (i.e. at night).

All speed limits applied as part of the TGS’s shall be strictly in accordance with the MUTCD Part 3, unless accompanied by a supporting risk assessment completed in accordance with AS / NZS 4360.
Where the TGS includes changes to regulatory signs or devices, the Contractor shall include roadwork signing records in accordance with Appendix B of the MUTCD Part 3 certified by the Nominated Traffic Officer with the TGS.

2.4 Implementation

On a daily basis, the Contractor shall ensure that all applicable traffic redirection and / or warning measures and safety requirements are implemented prior to proceeding with any relevant WUC.

The Contractor shall monitor the effectiveness of the TGS and revise it in response to incidents and / or unexpected traffic disruptions.

2.5 Provision for Traffic

2.5.1 General

Traffic shall be controlled at all times, during construction, in accordance with the provisions of the MUTCD Part 3.

2.5.2 Administration of Traffic Management

Where traffic control is required, the Contractor shall nominate the preferred Traffic Management Company to the Superintendent for review and approval at least 14 days prior to being required, and forms a construction Hold Point.

All traffic controllers shall hold an appointment as an accredited person under Section 21 of the Transport Operations (Road Use Management) Act 1995 to perform the functions of a traffic controller as prescribed by the Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2005.

2.5.3 Out-of-Hours Representatives

The Contractor shall nominate a minimum of two (2) representatives to address traffic management issues, one (1) of whom shall be available at all times outside of the Contractor's normal working hours. The Contractor shall notify the Superintendent of the name, address and telephone number of the nominated persons. Such persons, when requested by the Superintendent, shall co-ordinate and expedite immediate repairs to and maintenance of such part of the WUC as may be considered necessary by the Superintendent and shall carry out such work to the satisfaction of the Superintendent.

If a nominated person leaves the employ of the Contractor during the period of the Contract, the Contractor shall immediately nominate another person and provide the full details of that person.

2.5.4 Inspection and Records

The Contractor shall inspect all traffic control devices and traffic control arrangements in accordance with Appendices A and B of the MUTCD Part 3.

As an alternative to the record keeping arrangements outlined in the MUTCD Part 3, photographic and / or video evidence of the TGS is permitted. Photographic and / or video evidence shall include date and time stamps and GPS location and be of sufficient resolution to accurately identify and locate traffic control devices. GPS coordinates shall be in World Geodetic System 1984 (WGS84) format or Geocentric Datum of Australia 1994 (GDA94) format, with latitude and longitude in decimal degrees. Time and date stamping shall be in Australian Eastern Standard Time (Coordinated Universal Time + 10 hours).

Records shall be retained by the Contractor in accordance with the Limitations of Actions Act 1974, for actions associated with personal injury (plus as long as required for any claims to be resolved). Records shall be provided to the Superintendent at the end of each month or upon request.

The Contractor may be required to provide evidence in court in the event that a speeding infringement notice is challenged, or in the event of a traffic incident within the Site.

2.5.5 Traffic Crashes and Incidents

In the event of a traffic crash / incident within the Site, the Contractor shall record the date and take time and date stamped photographs of the signs / devices present in the vicinity of the crash. In the event of a traffic crash / incident that requires notification to Police and relevant Emergency Services, the Contractor shall make the appropriate notifications. All crashes / incidents shall be recorded in the incident log. A copy of the incident log shall be forwarded to the Superintendent within 24 hours of the incident, or upon request.

The Contractor shall assist with the mitigation of the impacts of incidents as much as is reasonably practicable.
2.5.6 Audits
The Superintendent may undertake performance / compliance audits of the Contractor's traffic control measures and provide feedback where necessary.

If the Superintendent is of the view that, despite a TGS being in conformance with the MUTCD Part 3 and this Specification and the implemented scheme being in conformance with the TGS, the scheme is unsafe in some way, the Contractor shall undertake the necessary modifications to the TGS to address the identified issues.

In the case of non-conformance, the Administrator will request the Contractor raise a Non-Conformance Report (NCR). All non-conformances associated with traffic management shall be remedied by the Contractor within two (2) hours of the receipt of notice requesting a NCR. Failure to remedy the non-conformance within the two (2) hour period shall entitle the Principal to carry out any remedial work deemed necessary pursuant to the Contract. All costs related to this work shall be charged to the Contractor.

2.5.7 Complaints
The Contractor shall keep a register of all complaints received and actions taken to address each complaint. The complaints register shall be forwarded to the Superintendent on a weekly basis. The Contractor shall similarly keep a register of requests for information from the public. This public information request register shall also be forwarded to the Superintendent on a weekly basis.

2.6 Restrictions to Traffic
2.6.1 Restriction on Work
Unless otherwise approved by the Superintendent, no work which impacts directly upon traffic shall be permitted on:

a) The Thursday before Easter;
b) ANZAC Day;
c) During the period from the day prior to Christmas Day until New Year's Day, both inclusive; and / or
d) Any major commercial, sporting or cultural event, where the Superintendent considers that the scheduled works would cause an unacceptable level of disruption to the traffic operations associated with such events.

2.6.2 Traffic Lanes Restrictions
The traffic flow arrangement, number and width of traffic lanes, clearance to objects, the minimum posted speed and queuing timeframes shall be:

**During Work Hours**
- Minimum Traffic Flow – single lane, one way traffic, under traffic control
- Minimum Lane Width – 3m
- Minimum Clearance to Objects – as per MUTCD Part 3
- Minimum Posted Speed – 40km/hr or as per approved TGS
- Maximum Queuing Time – 5mins

**Out of Work Hours**
- Minimum Traffic Flow – two lanes, two way traffic, under traffic control devices
- Minimum Lane Width – as per pre-existing lane widths
- Minimum Clearance to Objects – as per MUTCD Part 3
- Minimum Posted Speed – 60km/hr or as per approved TGS
- Maximum Queuing Time – Nil

The Contractor shall not stop traffic simultaneously in both directions unless where prior approval has been granted by the Superintendent.

2.6.3 Access to Private Property
Existing accesses to private properties affected by the Work shall be maintained in useable condition during the construction, or alternative access arrangements acceptable to the property owners / tenants shall be made. The Contractor shall permit and provide for the free movement of traffic in and out of the properties at all times except as otherwise agreed to by the property owners / tenants.

The Contractor shall, at no expense to the Principal, make good any damage to accesses to private properties which results from the Contractor's operations during the construction of the WUC.
2.6.4 Pedestrian Movements

Where it is necessary to provide for pedestrian and / or cyclist access along or across portions of the WUC, the Contractor shall provide such temporary pathways as necessary in accordance with the requirements of the MUTCD Part 3.

The pathways shall be clearly delineated, signed and fenced to prevent unintended access to the remainder of the WUC. Signs shall be provided adjacent to the pathway to clearly indicate that access to the remainder of the WUC is prohibited.

Adequate illumination shall be provided during all periods of darkness.

Where a large volume of pedestrian traffic has to cross the worksite, consideration shall be given to directing pedestrians to suitably constructed and protected crossings.

Special provision for pedestrians may be required where the direction of traffic flow is opposite to that normally expected.

2.7 Implementation of Controls

2.7.1 Traffic Control Devices

Traffic control devices and their use shall conform to the requirements of the MUTCD Part 3.

All traffic control devices shall be securely fixed in the correct position and maintained in an effective and clean condition suitable for day and night operations whilst employed on the WUC. Devices which are damaged or worn, or which do not conform to the above requirements, shall not be used.

2.7.2 Variable Message Signs

Variable Message Signs (VMS) can be used to supplement other traffic control devices, particularly in communicating complex arrangements to drivers. The need for these devices should be determined through a risk assessment either to supplement other traffic control devices or as an alternative traffic control device when site conditions constrain a preferred TGS layout.

2.7.3 Use of Police

Police shall be limited to occasions where a risk assessment indicated that their presence mitigates the need for other more costly measures.

Where police officers are to be employed to assist in the control of traffic around or through the Works, the Contractor shall be responsible for making all necessary arrangements with the local Police Station or relevant branch of the Queensland Police Services and for making all payments.

2.7.4 Delineation

Delineation shall consist of bollards, traffic cones, individual hollow plastic ballasted barrier elements or mesh fencing using a heavy, highly visible plastic safety mesh. Star pickets shall not be used within 1m of the edge of adjacent traffic lanes for speeds of 80 km/hr or more.

When used as delineators, hollow plastic temporary road safety barrier (TRSB) elements are not required to be filled with water or be linked but shall be partially filled with water to provide stability against movement by the action of passing traffic or by winds.

Drums and cylinders which can roll if dislodged by impact or wind shall not be used as temporary delineators. Stand-alone non-interconnected lightweight modules, which do not meet the requirements for a TRSB, shall not be used as temporary delineators.

2.7.5 Temporary Road Safety Barriers

TRSB shall be used to contain and redirect errant vehicles so as to reduce the likelihood of them entering the worksite.

When TRSB are used to protect the worksite, the requirements to maintain a clearance zone behind the TRSB as specified in the MUTCD Part 3 shall apply. The maximum dynamic deflection is specified by the manufacturer.

Opposing flows of traffic may also be separated with TRSB with sufficient offset provided to reduce the likelihood that TRSB deflect into opposing traffic flow in the event of impact.

Only TRSB which have been assessed and are compliant with AS / NZS 3845:1999 Road Safety Barrier Systems shall be used, with any placement of TRSB also being placed in accordance with AS / NZS 3845:1999.

The Contractor shall maintain TRSB on their correct alignment for the period that they are installed on the Worksite.
Provisions shall be made to treat the approach and / or departure ends of TRSB that are exposed to on-coming traffic, including barriers that are flared to terminate outside the clear zone. All TRSB and end treatments shall be installed in accordance with the manufacturer's specifications.

Care shall be taken at intersections to prevent visibility problems for motorists.

Water filled plastic barriers shall be filled with water to the level specified in the manufacturer's specifications.

All TRSB used shall have recesses at their base to allow drainage at ground surface level under the barriers.

2.7.6 Temporary Lighting

Where roadway lighting currently exists, lighting shall generally be provided during the Works. Ideally, existing lighting shall not be removed until alternative temporary lighting is provided to at least the same standard as the existing lighting. If temporary lighting is not provided, the Contractor must demonstrate that the associated risk can be managed through an alternative method.

The Contractor shall install, operate and maintain the temporary road lighting installations for the full period during which the relevant road is required and / or until the permanent road lighting is installed and becomes operational.

Temporary road lighting shall be installed to illuminate potential conflict points and / or hazards, which may include:

a) Significant changes in carriageway width  
b) Changes from single to divided carriageway  
c) Converging and diverging traffic streams  
d) Crests and humps  
e) Curves below 100m radius, and  
f) Road sections with high night time crash rates.

Where required, temporary lighting shall include two spans of lead-in lighting in advance of the conflict / hazard point.

Artificial lighting shall be arranged in such a manner as to avoid creating levels of glare arising from shallow angles of incidence towards the drivers of vehicles using the adjacent traffic lanes. At no time shall artificial lighting be directed towards oncoming traffic.

3 EARTHWORKS

3.1 Scope

The earthworks include, but are not limited to trench excavation, pipe installation, placement of embedment and trench backfill material, disposal of surplus material and acceptance testing requirements associated with the earthwork activities.

The Contractor shall limit its operations to legally accessible work areas defined in the Contract Drawings and / or as negotiated with adjacent land owners through separate Land Use Agreements (LUA).

3.2 Limitations on Clearing Operations

Any trees, shrubs and overhanging branches to be left undisturbed shall be clearly marked by the Contractor. This marking shall be carried out prior to clearing operations reaching the areas concerned. Hold Point

The Contractor shall take precautions to ensure that there is no unnecessary damage to stream beds or banks or any vegetation protection on them. Clearing operations within streams and waterways shall not include removal of stumps and roots below ground surface.

3.3 Stripping and Stockpiling of Topsoil for Re-use

Where stockpiling of topsoil is required, it shall be carried out in a manner which ensures that the properties of the topsoil are not permitted to degrade such that it becomes unsuitable as planting media. To assist preservation of planting media, the Contractor shall include the following provisions in the management of topsoil stockpiles:

a) Limiting the height of stockpiles to 3m  
b) Limiting the width of the base of stockpiles to 10m  
c) Adopting batter slopes, protective covers and drainage which reduce potential for erosion and/or segregation  
d) Limiting the period of stockpiling to a minimum practical time, and
e) Carrying out herbicide spraying or other treatment of the stockpile at intervals required to prevent weed growth and ensure the stockpile faces are weed-free prior to use.

Surplus material and material considered to be not suitable for use as planting media in accordance with the above shall be assessed for use elsewhere within the works. All surplus material shall be disposed of in accordance with all relevant Statutory Requirements.

Material shall not be removed from within drip lines of existing plants to be retained. The root systems of existing plants are to be retained and shall be preserved wherever practical.

All stripped areas outside of the immediate areas to be trenched shall be left in a neat, free-draining condition with side slopes not steeper than 1:4 unless otherwise specified, and shall be treated so as to conform with the environmental requirements of the Contract.

3.4 Surplus Material

Surplus material and material considered to be not suitable for use as planting media in accordance with the above shall be assessed for use elsewhere within the works. All surplus material shall be disposed of in accordance with all relevant Statutory Requirements.

Should the Contractor have surplus material less than 75mm in size at the completion of the Works, there is a potential for the Contractor to dispose of the surplus material (<75mm) at BRC’s waste facilities without incurring the relevant disposal fee. The Contractor shall liaise with the Superintendent prior to the completion of works to confirm whether the opportunity is still available. The Contractor shall be required to transport the surplus material (<75mm) from the on-site stockpile location to the waste facility, before unloading the material in a manner and location stipulated by the facility personnel.

4 TRENCH EXCAVATION, EMBEDMENT, TRENCH BACKFILL AND DISPOSAL OF SPOIL

4.1 General

Trench excavations and excavations for structures shall be carried out to the dimensions shown on the drawings or, where not so shown, to the minimum dimensions necessary to accurately and safely construct the WUC.

The Contractor shall take all necessary precautions to protect an excavation and all personnel and equipment in or about an excavation, including provision of all necessary temporary works and equipment. Upon completion of construction within an excavation, all temporary works shall be removed in such a way as not to damage any finished structure.

The use of excavated material as trench backfill shall be subject to the Contractor demonstrating conformance with the trench fill requirements outlined below Hold Point.

Excavated material which is surplus to the project requirements shall be disposed of in accordance with Clause 3.4 of this Technical Specification.

4.2 Allowable Horizontal Bearing Pressure

The bearing capacity of the in-situ material shall be inspected in accordance with SEQ-SEW-1200-1 to confirm the nominated trench support type Hold Point.

Where the bearing capacity of the in-situ material does not meet the minimum requirements of the nominated trench support type, the Superintendent will advise the Contractor of the revised trench type, in manner that expedites the Works, and does not exceed three (3) hours.

Material deemed as being inadequate for the nominated trench support type shall be excavated to the depth nominated by the Superintendent. Inadequate material may be disposed of on-site, subject to the material meeting the requirements of the nominated use, or disposed of off-site in accordance with all relevant Statutory Requirements.

4.3 Embedment Material

Embedment material (import only) shall comply with the requirements of WSA03-2011 Part 2: Construction Clause 16.2 Hold Point

Conformance Test Requirements - 2 x Grading
Test Frequency - 2 per Material Type
Maximum Supply Lot Size - 750m3

Embedment material shall be placed in accordance with WSA03-2011 Part 2: Construction Clause 16.
4.3.1 Compaction Requirements – Embedment Zone

Compaction of the embedment material shall generally be in accordance with WSA03-2011 Part 2: Construction, with the exception of the following embedment testing requirements:

Conformance Testing Requirements - 2 x Density (Relative / Density Index)
Maximum Lot Size - 1 Days Production
Normal Testing Frequency - 2 tests per Lot
Reduced Level of Testing - 1 test per every 3rd Lot

Minimum Compaction Value - In accordance with WSA03-2011 Part 2: Construction Table 19.1

Note: If embedment material is single size aggregate in accordance with WSA 03 Part 3 clause 16.2, no embedment compaction testing is required.

4.4 Geotextile Material

Geotextile material to be Strength Class C, Filtration Class V and to be approved by Superintendent prior to use.

Hold Point

Note: If single size aggregate is used as embedment material, geotextile shall be installed at the interface of the embedment and trench backfill materials.

4.5 Trench Fill Material

Clean excavated material from trenching works that is non-organic and of particle size less than 75mm, will be permitted for use as trench fill material. In driveway areas, there shall be a minimum of 200mm of type 2.3 gravel as a surfacing layer.

Imported trench fill material shall comply with the requirements of WSA03-2011 Part 2: Construction Clause 17.1.1 (Hold Point)

Conformance Testing Requirements – min. 2 x Grading / lot or method otherwise approved by the Superintendent.
Maximum Lot Size – 750m3

4.5.1 Compaction Requirements

Trench fill shall be placed and compacted in accordance with WSA03-2011 Part 2: Construction Clause 17.1.2 and 17.1.3, with the exception of the following embedment testing requirements:

Conformance Testing Requirements - 2 x Density (Relative / Density Index)
Minimum Compaction Value - 70% Non-Cohesive Materials, 95% Cohesive Materials
Maximum Lot Size - 1 Days Production
Normal Testing Frequency - 2 test per lot
Reduced Level of Testing - 1 test per every 3rd Lot

4.6 Type 7 Trench Support – Specific Requirements

Trench works associated with trench Type 7 shall generally be undertaken in accordance with Clause 4.1 – 4.5 of this Technical Specification, together with the following specific requirements:

4.6.1 Geotextile Pillow Foundation

A geotextile pillow shall be installed as a foundation to the pipe embedment material in accordance with WSA Std Dwg SEQ-SEW-1202-1, and shall consist of the following material requirements:

a) Geotextile Material - Strength Class C, Filtration Class V
b) Material Infill – single sized screenings (20mm), the specific testing requirements:
   i. Conformance Testing Requirements - 1 x Grading
   ii. Test Frequency - 1 x per Material Type
   iii. Maximum Supply Lot Size - 500m3

Within seven (7) days of commencing the relevant work activity, the Contractor shall submit to the Superintendent for review, the relevant material conformance documentation as outlined above Hold Point.

4.7 Testing

All costs associated with compaction and material testing in accordance with:

a) WSA 02 Part 3: Clause 22 / WSA 03 Part 2: Clause 19 / WSA 07 Part 3: Clause 21
b) the requirements of the BRC Technical Specification Clauses
c) the requirements of the Contractor's Quality Management Plan (QMP)
All compliance testing shall be based on work lots.

All compliance testing shall be carried out by a NATA registered laboratory, certified for the tests specified in the Contract.

Test locations are to be approved by the Superintendent to ensure that it representative of the lot.

All costs associated with ensuring that any subcontracted works / procured supplies are subject to the Contractor's QMP, such that when incorporated into the Works, the subcontracted works / procured supplies comply with the requirements of the Contract.

All costs associated with the provision of test results / conformance documentation for all Works (including subcontracted works / procured supplies) to the Superintendent for review in accordance with the timeframes specified in the Contract.

4.7.1 Level of Testing

The Contractor may request a Reduced Level of Testing as stated in this Technical Specification after no non-conformances have occurred in three (3) consecutive lots and it has been demonstrated to the Superintendent that the Contractor's processes are under control and are consistent.

Where the Contractor is operating at the Reduced Level of Testing and a non-conformance occurs for any requirement for a lot, the Contractor shall immediately revert to the Normal Testing Level for all standards and requirements.

5 DIRECTIONAL DRILLING

5.1 General

Earthworks shall be carried out in accordance with Clause 3 of this Technical Specification and shall be kept to the absolute minimum required for construction, as approved by the Superintendent.

5.2 Installation

Pipework (including jointing) to be installed via directional drilling in accordance with WSA03-2011 Part 2: Construction, in a manner that does not disturb the road pavement or shoulders.

All working platforms shall be re-instated to a pre-construction equivalent standard and shall be left in a neat, free-draining condition with side slopes not steeper than 1:4 unless otherwise specified, and shall be treated so as to conform with the environmental requirements of the Contract.

6 SEWERAGE PRESSURE MAINS – PIPEWORK BENDS AND FITTINGS

6.1 Materials and Storage

6.1.1 Pipes, fittings and bends

All pipework PVC-O (PN16), Ductile Iron (DI) pipes (PN35), stainless steel pipework (PN16) and associated fittings and bends shall be supplied and stored on-site in accordance with the Contract Drawings and WSA 03 Part 2.

PVC-O pipes intended for pressure sewerage uses shall be cream in colour as per AS/NZS 1477.

Marker tape shall be detectable in nature in accordance with WSA 07 Part 3 Clause 18.10.

Sealing rings are to be manufactured in accordance with AS 1646.

DI fittings shall be PN16 and internally and externally coated with a thermal bonded polymeric coating such as Polyamide (thermoplastic coating) or Fusion Bonded Epoxy (FBE – thermosetting coating) in accordance with AS / NZS 2280.

6.1.2 Flanges

All flanges shall be as per Table D of AS 2129, unless otherwise nominated by the Contractor after a review of the pressure ratings. All flanged fittings shall be provide with the appropriate flange gaskets, stainless steel bolts, nuts and washers.

6.1.3 Valves

Valves, valve chambers, scours and surface fittings shall be supplied and stored on-site in accordance with the Contract Drawings and the manufacturer's specifications.
Isolation valves to be resilient seated, **anti-clockwise closing** sluice valves, conforming to AS / NZS 2638.2, with a pressure rating of 1,600kPa. Valves to be flanged to BS10 Table D and coated both internally and externally with an approved bonded epoxy. Valves shall be able to operate from fully closed to fully open with no leakage occurring during the disc and body pressure test.

6.2 **Installation**

PVC-O, DI pipes and stainless steel pipes, associated fittings and bends shall be installed as per the Contract Drawings and WSA 03 Part 2 Clause 15.

Valves, valve chambers, scour and surface fittings shall be installed as per the Contract Drawings and WSA 07 Part 3 Clause 18.13.

6.3 **Testing**

Pressure testing of the works shall be in accordance with WSA 07 Part 3 Clause 21.4.1 and 21.6.

All compliance testing shall be based on work lots and undertaken by a NATA registered laboratory, certified for the tests specified in the Contract.

6.4 **Construction Tolerances**

Construction tolerances associated with the sewerage pressure mains shall generally be as per WSA 07 Part 3 Clause 22, with the exception of the following section which shall supersede Clause 22.3:

Vertical tolerances do not deviate the inverts of the sewerage pressure main, fittings and associated structures from the specified design level (or interpolated design level) by more than 50mm higher or lower, providing the depth from final ground surface level to the top of pipe exceeds the minimum cover stated in the Standard Drawings.

7 **RE-INSTATEMENT**

Work Operations shall be carried out to the dimensions shown on the Drawings or, where not shown, to the minimum dimensions necessary to accurately and safely complete the WUC.

The Contractor shall limit its operations to legally accessible work areas defined in the Contract Drawings and / or as negotiated with adjacent land owners through separate LUA.

Should the contractor disturb additional area, over and above that which is outlined in the Drawings, or could reasonably be expected to complete the WUC, the Contractor shall be required to re-instate the additional disturbed area to the pre-construction standard at no expense to the Principal.

7.1 **Property Accesses – Unsealed**

Work Item 5.3 and 5.4 relates to the re-instatement of unsealed accesses directly affected by the WUC.

Earthworks and excavations shall be carried out in accordance with Clause 3 of this Technical Specification.

The supply and placement of replacement pavement material, to a nominal depth of 200mm, shall be in accordance with the following subsection of this specification. Areas requiring a greater of depth treatment shall be agreed on-site with an Inspector.

7.1.1 **Materials**

Type 2.1C unbound material shall be as TMR’s Technical Specification MRTS05 Unbound Pavements, with material testing results to be forwarded to the Superintendent if requested for review, prior to the initial incorporation into the works, at a supply lot interval of 500m3 / material type.

7.1.2 **Restoration Standard**

The finished surface shall conform to the shape and profile of the existing adjacent pavement.

The Contractor shall place the pavement materials in a manner that is consistent with the compaction equipment available on-site.

The Superintendent may request a conformance compaction test (1 x Density) to which the minimum compaction requirement would be 98% relative dry density.
A proof roll may be requested by the Superintendent to be conducted over each pavement re-instatement lot, by which a vehicle with a gross vehicle mass of 20 tonnes shall transverse the lot without visible deflection being observed over the lot in order to achieve conformance.

The deviation from a 3m straightedge placed along the wheel paths and interfaces shall be no more than +8mm, -5mm with due allowance being made for design shape, where relevant. Testing frequencies shall be:

1 x straight edge test at each interface

7.2 Property Accesses / Road Shoulder – Two Coat Bitumen Seal

Work Item 5.2 relates to the re-instatement of sealed property accesses and road shoulders directly affected by the WUC. The following subsections of this specification outlines the requirements associated with the re-instatement of a two coat bitumen seal (Class C170) including binder and cover aggregates (7mm and 14mm). Earthworks and excavations shall be carried out in accordance with Clause 3 of this Technical Specification.

The supply and placement of replacement pavement materials shall be in accordance with Clause 7.1 of this Technical Specification.

7.2.1 Seal Design and Nominated Sub-contractor

Within seven (7) days of commencing sealing works, the Contractor shall nominate the relevant sub-contractor tasked with undertaking the sealing works and submit a proposed seal design to the Superintendent for review Hold Point.

Seal designs shall be determined in accordance with the requirements of Austroads Technical Report AP T68/06 Update of the Austroads Sprayed Seal Design Method and TMR’s Technical Specification MRTS11 Sprayed Bituminous Surfacing (Excluding Emulsion). The relevant seal design input is as follows:

- **Type** – Double Double
- **Binder Type** – Bitumen Class C170
- **Cover Aggregate** – Pre-coated 14mm and 7mm
- **AADT** – Road specific data to be provided upon request

7.2.2 Materials

Cover aggregates shall be as per TMR’s Technical Specification MRTS22 Supply of Cover Aggregate with the maximum testing supply lot being 500m³.

Quality assurance documentation associated with bituminous materials shall be on the request of the Superintendent and shall be in accordance with MRTS11.

7.2.3 Restoration Standard

The dimensions of the seal application shall not be less than, nor exceed by 150mm, the length and width specified in the Contract Drawings or the Superintendent.

Application shall generally be in accordance with MRTS11, with the final lot presenting as a uniform with close stone contact and no loose materials left on the adjacent sealed road. The Contractor shall provide the relevant spray sheet from the sub-contractor as part of the lot quality assurance documentation (maximum lot size – one days production).

7.3 Asphalt Footpath

Work Item 5.1P relates to the re-instatement of the asphalt footpath directly affected by the WUC.

Earthworks and excavations shall be carried out in accordance with Clause 3 of this Technical Specification.

The supply and placement of replacement pavement materials shall be in accordance with Clause 7.1 of this Technical Specification.

7.3.1 Asphalt Mix Design and Nominated Sub-contractor

Within seven (7) days of commencing asphalt works, the Contractor shall nominate the relevant sub-contractor tasked with undertaking the asphalt works and submit a proposed asphalt mix design to the Superintendent for review Hold Point.

Asphalt mix designs shall be in accordance with TMR’s Technical Specification MRTS30 Asphalt Pavements. The relevant asphalt requirements are as follows:
Type – Dense grade
Maximum Stone Size – 10mm
Layer Thicknesses – 30mm for accesses, 40mm for road surfacing

7.3.2 Materials
Quality assurance documentation associated with the supply of asphalt materials shall be on the request of the Superintendent and shall be in accordance with MRTS30.

7.3.3 Construction
The Contractor shall ensure that the existing surface is thoroughly swept using a rotary broom to remove any loose material or other deleterious material which may be present. Any deleterious material which still adheres to the surface after sweeping shall be removed by other means.

A bitumen emulsion tack coat shall be applied by spray bar fitted to a mechanical sprayer. Hand spraying shall be carried out only in those areas where it is impractical to use a mechanical sprayer.

The tack coated surface shall not be opened to public traffic.

The asphalt shall be supplied and placed in accordance with the requirements of MRTS30.

7.3.4 Restoration Standard
The finished pavement properties shall be as per the requirements of MRTS30.

The final asphalt surface shall nearly tie into the existing road surface and geometrics, be free draining with a maximum deviation from a 3m straightedge placed along the wheel paths and interfaces not greater than more than ±5mm with due allowance being made for design shape, where relevant.

Straight edge testing frequencies shall be:
1 x straight edge test at each interface
1 x straight edge test per patch per wheel path per 20 linear metres

The Contractor shall provide the relevant quality assurance documentation from the sub-contractor as part of the Contractor’s lot quality assurance documentation (maximum lot size – one (1) days production).