INFORMATION FOR TENDERERS

GLADSTONE REGIONAL COUNCIL

CONTRACT No. 157-17

QUALITY ASSURED, SCHEDULE OF RATES CONTRACT
for the
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

INFORMATION FOR TENDERERS

PREPARED BY: COUNCIL’S ENGINEERING SERVICES DEPARTMENT
DATE: February 2017
1 PROJECT INFORMATION

1.1 PROJECT IDENTIFICATION

Construction of DN160 PE sewer rising main from NRG to the distribution tower at the Gladstone Waste Water Treatment Plant (WWTP).

It is a Quality Assured contract with method of payment being Schedule of Rates.

1.2 LOCATION PLAN

Note that this plan is indicative only. Determine specific location by referencing the drawings, plans and specification.

Figure 1 - Locality Plan

1.3 PROJECT DESCRIPTION

A 150mm diameter AC main currently delivers wastewater from the Gladstone Power Station to Gladstone Wastewater Treatment Plant. The main was installed in 1971 and is coming to the end of its useful life. The line has also experienced a number of breaks in recent years and as such Council has decided to replace the old AC main with a PE line.

This project involves the supply and installation of 345m of DN160 PE PN16 pipe and a timely delivery of this project is of high importance.

This project will include underboring of Hansen Road and the removal of remnant vegetation within the boundary of Gladstone WWTP along with several service crossings. All required environmental permits will need to be sought by the successful contractor prior to the removal of any remnant vegetation. All required approvals will need to be sought from the Department of Transport and Main Roads and NRG by the contractor prior to working within the road reserve and within NRG land respectively. All required approvals will need to be sought from Jemena, GAWB, AARNet and NextGen prior to commencement of underboring and a Jemena representative will be required on site during works around the gas main.
2 RELEVANT DOCUMENTS

Documents: Request for tender documents for this project includes the following:

- Information for Tenderers
- Conditions of Tendering (AS 4120)
- VOLUME 1 – Conditions of Contract
  . Special Conditions of Contract
  . General conditions of contract (AS 4000)
  . Annexures to General Conditions of Contract
- VOLUME 2 – Technical specifications
  . General Specifications (sourced from NatSpec, & including but not limited to)
    . Management Plans
    . 0136 General Requirements (Construction)
    . 0161 Quality (Construction)
    . 0173 Environmental Management
    . 0257 Landscape - Road Reserve and Street Trees
    . 0310 Concrete - combined
    . 1101 Traffic Management
    . 1102 Control of Erosion and Sedimentation (Construction)
    . 1111 Clearing and Grubbing
    . 1361 Sewerage Network - Reticulation (Construction)
    . Capricornia Municipal Design Guidelines - D12 - Sewerage Network
  . Refer to the Specifications on the Project Drawings
- VOLUME 3 – Drawings and Schedules
  . Project Drawings
    . 16-047-000 - Cover Sheet, Locality Plan and Drawing Index
    . 16-047-001 - Standard Notes
    . 16-047-002 - Alignment set out details
    . 16-047-400 - General layout
    . 16-047-401 - Plan and Section Details sheet 1 or 3
    . 16-047-402 - Plan and Section Details sheet 2 or 3
    . 16-047-403 - Plan and Section Details sheet 3 or 3
    . 16-047-404 - Rising Main Details
    . 16-047-405 - General Details
  . Supplementary Standard Drawings
    . CMDG-W-041 - Water Main Thrust Block Details
    . CMDG-S-073 - Scour Valves Construction Details
    . CMDG-s-090 - Sewer Construction, Pipeline Construction Types
    . CMDG-W-060(D) - Hydrants and Valve Installation
    . CMDG-W-061(C) - Hydrants and Valve Surface Boxes
    . WAT-1209 - Trench Drainage Bulkheads & Trenchstop
- VOLUME 4 – Tender Submission Documents
  . Tender Submission Documents
  . The Schedule of Rates
  . Construction Program
  . Demonstration of Understanding Statement/Methodology
The Principal does not guarantee that the information contained in any of these documents is accurate or complete and the Tenderer must make their own interpretation of the information contained within the reports when preparing the Tender.

3 COUNCIL'S CONTACT PERSON

General: Direct enquiries regarding this request for tender only to:

<table>
<thead>
<tr>
<th>Name: George Baker</th>
<th>Phone: (07) 4975 8167</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position: Engineer - Water Services</td>
<td>Email: <a href="mailto:GeorgeB@gladstone.qld.gov.au">GeorgeB@gladstone.qld.gov.au</a></td>
</tr>
</tbody>
</table>

4 SITE INSPECTION AND BRIEFING MEETING

Tenderer responsibility: Before submitting the Tender, become familiar with the Works and the site.

Option 1: Tenderers may conduct site inspections on their own behalf by arrangement with the Council’s contact person.

Option 2: Tenderers are required to attend the mandatory pre-tender briefing meeting and site inspection in order to submit a conforming tender.

- The briefing meeting and site inspection will be held on:

<table>
<thead>
<tr>
<th>Day: Tuesday</th>
<th>Date: 28 February 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time: 12.00 noon</td>
<td>Place: Convene at Gladstone WWTP, 47 Albert Road, Gladstone for briefing discussion followed by site visit.</td>
</tr>
</tbody>
</table>

The meeting will be minuted and the minutes forwarded to all Tenderers and shall become part of the request for tender documents. Tenderers will be required to sign an attendance sheet at the meeting. The meeting will comprise of a formal briefing followed by a site visit to the construction site.

5 TENDER LODGEMENT REQUIREMENTS

5.1 CLOSING TIME AND DATE

General: Submit Tenders before the closing time and date for Tenders. It is the Tenderer’s responsibility to make sure the Tender is lodged on time. Failure to meet these submission requirements may render the submission invalid.

| Time: 2:00pm | Date: 16 March 2017 |

5.2 ELECTRONIC LODGEMENT

General: Lodge Tenders at www.lgtenderbox.com.au (Electronic tender box). Allow sufficient time for tender lodgement including any time that may be required for problem analysis and resolution before the closing time.

Tender submission documents: Complete the tender submission questions (replicated in the forms provided by the Principal in VOLUME 4 - Tender Submission) at the Electronic tender box.

Supporting material: Submit any supporting material with the relevant questions at the Electronic tender box.
5.3 MANUAL LODGEMENT

General: Submit Tenders on the forms provided by the Principal in VOLUME 4 - Tender Submission. Enclose two hard copy documents (one marked original, one marked copy and one USB soft copy in a sealed envelope and legibly mark the envelope marked as follows:

<table>
<thead>
<tr>
<th>Contract No.</th>
<th>Tender for</th>
</tr>
</thead>
<tbody>
<tr>
<td>157-17</td>
<td>NRG TO GLADSTONE WASTEWATER TREATMENT RISING MAIN</td>
</tr>
</tbody>
</table>

and either:
delivered by hand or by courier and placed in the:
Tender Box
Ground Floor
Gladstone Regional Council
101 Goondoon Street
Gladstone QLD 4680
CONDITIONS OF TENDERING

GLADSTONE REGIONAL COUNCIL

CONTRACT No. 157-17

QUALITY ASSURED, SCHEDULE OF RATES CONTRACT for the
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

CONDITIONS OF TENDERING AS PER AS4120-1994

PREPARED BY: COUNCIL'S ENGINEERING SERVICES SECTION
DATE: February 2017
1 CONTRACT INFORMATION

1.1 PREAMBLE
The Conditions of Tendering have been prepared in accordance with AS 4120 Code of Tendering which sets out the ethics and obligations of the Principal and Tenderers in the tendering process in the construction industry.

Tenderers and Principal shall comply with the requirements of AS 4120. In particular, attention is drawn to the obligations of Tenderers in preparing and submitting their Tender for this project. Without limiting the above obligations:
- Tenderers shall not submit tenders without a firm intention to proceed
- Tenderers must not engage in any form of collusive practice
- Any Tenderer who directly or indirectly canvasses support from an elected member or servant of the Council will be disqualified

In all request for tender documentation, words importing a gender include every gender.

1.2 PROJECT INFORMATION
NRG TO GLADSTONE WASTEWATER TREATMENT RISING MAIN
It is a QUALITY ASSURED contract with method of payment being SCHEDULE OF RATES.

Project description: The complete project description, scope of work, specific site and project requirements are defined in VOLUME 2 – Technical Specifications and VOLUME 3 – Drawings of the request for tender documents.

1.3 RELEVANT DOCUMENTS
Documents: Request for tender documents for this project includes the following:
- Information for Tenderers
- Conditions of Tendering (AS 4120)
- VOLUME 1 – Conditions of Contract
  . Special Conditions of Contract
  . General conditions of contract (AS 4000)
  . Annexures to General Conditions of Contract
- VOLUME 2 – Technical specifications
  . General Specifications (sourced from Natspec, & including but not limited to)
    . Management Plans
    . 0136 General Requirements (Construction)
    . 0161 Quality (Construction)
    . 0173 Environmental Management
    . 0257 Landscape - Road Reserve and Street Trees
    . 0310 Concrete - combined.
    . 1101 Traffic Management.
    . 1102 Control of Erosion and Sedimentation (Construction).
    . 1111 Clearing and Grubbing
    . 1152 Road Openings and Restoration
    . 1361 Sewerage Network - Reticulation (Construction)
    . Capricornia Municipal Design Guidelines - D12 - Sewerage Network
    . Refer to the Specifications on the Project Drawings
- VOLUME 3 – Drawings and Schedules
  . Project Drawings
    . 16-047-000 - Cover Sheet, Locality Plan and Drawing Index
    . 16-047-001 - Standard Notes
Conditions of Tendering

GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

Contract No. 157-17

- 16-047-002 - Alignment set out details
- 16-047-400 - General layout
- 16-047-401 - Plan and Section Details sheet 1 or 3
- 16-047-402 - Plan and Section Details sheet 2 or 3
- 16-047-403 - Plan and Section Details sheet 3 or 3
- 16-047-404 - Rising Main Details
- 16-047-405 - General Details

Supplementary Standard Drawings.
- CMDG-W-041 - Water Main Thrust Block Details
- CMDG-S-073 - Scour Valves Construction Details
- CMDG-S-090 - Sewer Construction, Pipeline Construction Types
- CMDG-W-060(D) - Hydrants and Valve Installation
- CMDG-W-061(C) - Hydrants and Valve Surface Boxes
- WAT-1209 - Trench Drainage Bulkheads & Trenchstop

- VOLUME 4 – Tender Submission Documents
  - Tender Submission Documents
  - The Schedule of Rates
  - Construction Program
  - Demonstration of Understanding Statement/Methodology

The Principal does not guarantee that the information contained in any of these documents is accurate or complete and the Tenderer must make their own assessment as to the validity of the information when preparing the Tender.

1.4 CONTRACTOR’S RESPONSIBILITY

Requirement: Ascertain all information relating to the services, the works and site conditions that may affect the progress or method of performing all services and works are documented and are within the scope of this contract. Prepare for every contingency that may arise. It is further understood that just provision for these contingencies have been accounted for, implicitly or explicitly within the Bill of Quantities or Schedule of Rates submitted.

1.5 COUNCIL’S CONTACT PERSON

General: Direct enquiries regarding this request for tender only to:

All questions and responses will be provided to all registered tenderers for the mandatory Pre Tender Site Inspection Meeting.

<table>
<thead>
<tr>
<th>Name: George Baker</th>
<th>Phone: (07) 4975 8167</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position: Engineer - Water Services</td>
<td>Email: <a href="mailto:GeorgeB@gladstone.qld.gov.au">GeorgeB@gladstone.qld.gov.au</a></td>
</tr>
</tbody>
</table>

1.6 SITE INSPECTION AND BRIEFING MEETING

Option 1: Tenderers may conduct site inspections on their own behalf by arrangement with the Council’s contact person.

OR

Option 2: Tenderers are required to attend the pre-tender briefing meeting and site inspection in order to submit a conforming tender.

- If Tenderers wish to have specific issues addressed at this meeting, formal notification should be forwarded to Council’s contact person at least 1 day prior to the meeting.
- The briefing meeting and site inspection will be held on:

| Day: Tuesday | Date: 28 February 2017 |
Conditions of Tendering

GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

Contract No. 157-17

Time: 12.00 noon
Place: Convene at Gladstone WWTP, 47 Albert Road, Gladstone for briefing discussion followed by site visit.

- The meeting will be minuted and the minutes forwarded to all Tenderers and shall become part of the request for tender documents. Tenderers will be required to sign an attendance sheet at the meeting. The meeting will comprise of a formal briefing followed by a site visit to the construction site.

2 TENDER LODGEMENT REQUIREMENTS

2.1 CLOSING TIME AND DATE

General: Submit Tenders before the closing time and date for Tenders. It is the Tenderer’s responsibility to make sure the Tender is lodged on time. Failure to meet these submission requirements may render the submission invalid.

Time: 2:00pm
Date: 16 March 2017

2.2 ELECTRONIC LODGEMENT

General: Lodge Tenders at www.lgtenderbox.com.au (Electronic tender box). Allow sufficient time for tender lodgement including any time that may be required for problem analysis and resolution before the closing time.

Tender submission documents: Complete the tender submission questions (replicated in the forms provided by the Principal in VOLUME 4 – Tender Submission) at the Electronic tender box.

Supporting material: Submit any supporting material with the relevant questions at the Electronic tender box.

2.3 MANUAL LODGEMENT

General: Submit Tenders on the forms provided by the Principal in VOLUME 4 – Tender Submission. Enclose two hard copy documents (one marked original, one marked copy and one USB soft copy in a sealed envelope and legibly mark the envelope marked as follows:

Contract No. 157-17
Tender for NRG TO GLADSTONE WASTEWATER TREATMENT RISING MAIN

and either:
delivered by hand or by courier and placed in the:
Tender Box
Ground Floor
Gladstone Regional Council
101 Goondoon Street
Gladstone QLD 4680

2.4 TENDERS VIA EMAIL OR FACSIMILE

General: Tenders submitted via email or facsimile will not be considered under any circumstances.

2.5 LATE TENDERS

A posted tender which is received after the closing time and date will only be considered if the Tenderer can satisfy Council that the formal tender documents and all other requisite essential information were posted or lodged at a Post Office or other recognised delivery agency within a reasonable time to ensure delivery before the deadline for closing of tenders, and the Tenderer has taken all possible action to expedite delivery when notified of a late arrival.
Essential information means all information in the Tender Form and all information which is required by the Conditions of Tendering for submission with the Tender Form.

2.6 TENDER VALIDITY PERIOD

Tenders will be valid for a period of 90 days from the tender closing date. In the event of the withdrawal of the Tender prior to the expiration of this period, the Tenderer shall be liable for all costs, losses or damages suffered by the Principal by reason of that withdrawal.

2.7 IN HOUSE TENDER

Gladstone Regional Council will not be submitting a tender for this project.

2.8 Opening of tenders

There will be no public opening of offers. Details of the names of tenders received shall be available by written request addressed to the Council Contracts Coordinator within forty-eight (48) hours from close of tender. Commercial - in - Confidence information shall not be publicly released. However Council reserves the right to disclose any prices and/or lump sum tender amounts in its Council meeting minutes following a decision on offers. Further, and in accordance with the Local Government Regulation 2012 (Part 4 Section 237), from 14th December 2012, Council is required to publish on its website and in a conspicuous place in its public office relevant details for contracts entered into that are worth $200,000 (excluding GST) or more however it may publish all tenders on its website regardless of price.

3 TENDER SUBMISSION INFORMATION

3.1 PRICES

Unless otherwise documented, conform to the following:
- Express prices in Australian Dollars and exclusive of GST.

3.2 SUPPORTING INFORMATION FROM TENDERERS

Provide, in VOLUME 4 documentary evidence to demonstrate they have the necessary competence, resources, industrial relations, quality and safety management and financial capacity to carry out the Works.

3.3 SUBCONTRACTORS

Provide, in VOLUME 4 – Tender Submission Documents, the names and telephone numbers of the Tenderer’s Subcontractors.
Recognise, with initials, the Principal’s listing of Selected and Nominated Contractors. Cross out if not applicable

3.4 ALTERNATIVE PROPOSALS

Alternative proposals, which satisfy the Principal’s basic commercial and performance objectives, technical and legal requirements, may be submitted as options but only in addition to a conforming tender. All costs associated with the design and documentation of any alternative proposal shall be borne by the Tenderer.

4 TENDER ASSESSMENT

4.1 TENDER EVALUATION AND SELECTION

Evaluation, negotiation and selection of tenders shall be in conformance with the requirements of AS 4120 Code of Tendering.
Compliance with Offer Documents:
Tenderers are required to (but not limited to):
- Submit Tender on time
- Provide evidence / certificates of currency of required Insurances
- Schedules completed in accordance with the intent of the tender schedules
- Requested information is provided

Following the initial Compliance assessment; if tender submissions do not substantially comply with the tender document they will not be further considered for evaluation.

The evaluation criteria are the following:

<table>
<thead>
<tr>
<th>CRITERIA (WEIGHTED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• TIMELINE / PROGRAM</td>
</tr>
<tr>
<td>▪ Submitted Program (Form 1 of Part B, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>• CAPABILITY / RESOURCES - TECHNICAL / PHYSICAL / PROJECT UNDERSTANDING</td>
</tr>
<tr>
<td>▪ Nominated project personnel (Form 10 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Current commitments (Form 6 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Register of subcontractors and suppliers (Form 12 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Major Machinery and equipment (Form 13 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Methodology/Demonstration of Understanding statement (Form 2 of Part B, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>• SAFETY RECORD</td>
</tr>
<tr>
<td>▪ Tenderer’s Particulars - WH&amp;S (Form 9 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Submitted Safety documentation</td>
</tr>
<tr>
<td>• PAST PERFORMANCE / REFERENCE CHECKS</td>
</tr>
<tr>
<td>▪ Relevant project history (Form 8 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Referee feedback including safety checks (Form 11 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>• QUALITY SYSTEM / QA AND EMS (refer 4.6)</td>
</tr>
<tr>
<td>▪ Tenderer’s Particulars - Quality Assurance (Form 9 of Part A, Vol. 4 Tender submission docs.)</td>
</tr>
<tr>
<td>▪ Submitted Quality documentation</td>
</tr>
<tr>
<td>• WHOLE OF CONTRACT PRICING</td>
</tr>
</tbody>
</table>

If a tenderer is given a rating of zero for any of the criteria listed above, the entire submission will be void.

Enhancement of local business and industry is a non-weighted criterion that will be considered.
- To this end note the following definitions: (Form 3 and Form 12 of Part A, Vol. 4 Tender submission docs.)
Conditions of Tendering

GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

Contract No. 157-17

"Local Supplier" - means a business or industry that operates predominantly in the Council region or a business that has a significant presence in the Council region (i.e. a workshop or office and permanent employees resident in the Council region) and the majority of the work to be entered into through a contractual arrangement with Council will be undertaken by employees resident in the Council area and/or other Local Businesses and Industry (as determined by council in the event of any dispute);

"Local Supply" - means a supply of goods manufactured or stocked at the business’ premises located within the Council region for supply to the general public or a supply of services by personnel engaged (or to be engaged) for delivery of services have their principle place of residence within the Council region Industry (as determined by council in the event of any dispute);

The Principal is not bound to accept the lowest, or any tender.
The Principal may request an independent Financial Capability assessment - (refer 4.2(b))
The successful Tenderer, and the price which is accepted, shall be notified in writing to all Tenderers

4.2 POST TENDER SUBMISSIONS

(a) The Principal may call for post tender submissions from some or all tenderers in order to assist with the evaluation.
Such submissions will be confidential between the Principal and Tenderer.
The call for such submissions will not bind the Principal to proceed to accept a tender.

(b) With the Tenderers consent and willing participation, the Principal may, at its cost engage the services of an Independent Financial Assessment Agency to provide an objective assessment of the Tenderers Financial Capability.
If the Tenderer is not willing to participate in this process, the Tender submission will be void.
If an "Acceptable" or better rating is returned, the Tenderer will be further considered.
If a less than "Acceptable" rating is returned, the Tenderer will have an opportunity to provide further information. The Tender Panel will then assess this additional information. The Tender Panel at its discretion will then decide whether the entire Tender submission will be further considered or rejected, based on this Financial Assessment and any further supporting information that is provided.
This information will only apply to this tender assessment, and will not prejudice further assessments, or any other current or future commercial arrangement that the tenderer may have with Council.

4.3 POST TENDER NEGOTIATIONS

The Principal may enter into negotiation with a Preferred Tenderer or a number of candidate tenderers.
Such negotiations will be confidential between the Principal and Tenderer and will be conducted in accordance with guidelines set out in AS 4120-1994. (Refer Cl 6.6 of AS4120)
The undertaking of negotiations will not bind the Principal to proceed to accept a tender.

4.4 COST OF TENDERING

All costs associated with tender preparation and submission shall be borne by the Tenderer.

4.5 CONTRACT COMMENCEMENT DATE

The commencement of the Contract is nominated as the date of the letter of acceptance of tender to the successful Tenderer. There shall be no Contract prior to the issue of a letter of acceptance.
Tenderers to note the requirements of Volume 1, Special Conditions of Contract, section 4 and the applicable 14 day period (Calendar days from date of letter of acceptance).

4.6 QUALITY MANAGEMENT

Tenderers will only be considered from those companies able to demonstrate current third party certification of their quality system to AS9001.
GLADSTONE REGIONAL COUNCIL

CONTRACT No. 157-17

QUALITY ASSURED, SCHEDULE OF RATES CONTRACT

for the

GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

VOLUME 1 of 4

- SPECIAL CONDITIONS OF CONTRACT
- GENERAL CONDITIONS OF CONTRACT AS PER AS4000-1997

PREPARED BY: COUNCIL’S ENGINEERING SERVICES SECTION
DATE: February 2017
## GENERAL CONDITIONS OF CONTRACT AS PER AS4000-1997

This Annexure shall be completed and issued as part of the tender documents and, subject to any amendments to be incorporated into the *Contract*, is to be attached to the General Conditions and shall be read as part of the *Contract*.

<table>
<thead>
<tr>
<th>Item</th>
<th><strong>Principal</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gladstone Regional Council</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ABN 27 330 979 106</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gladstone Regional Council</td>
<td></td>
</tr>
<tr>
<td></td>
<td>101 Goondoon Street</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLADSTONE QLD 4680</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Contractor (clause 1)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Contractor's address</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Superintendent (clause 1)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Superintendent's address</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>a) Date for practical completion (clause 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Period of time for practical completion (clause 1)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Governing law (page 5, clause 1 (h))</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>a) Currency (page 5, clause 1 (g))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Place for payments (page 5, clause 1 (g))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Place of business of bank (page 3, clause 1 (d))</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bill of quantities (subclause 2.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Alternative applying (subclause 2.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) If Alternative 2 applies, is the bill of quantities to be priced?</td>
<td></td>
</tr>
</tbody>
</table>

### Item Details:

**Item 1**: Principal

- Gladstone Regional Council
- ABN: 27 330 979 106

**Item 2**: Principal's address

- Gladstone Regional Council
- 101 Goondoon Street
- GLADSTONE QLD 4680

**Item 3**: Contractor (clause 1)

**Item 4**: Contractor's address

**Item 5**: Superintendent (clause 1)

- As appointed by the Principal (or Representative)

**Item 6**: Superintendent’s address

- 101 Goondoon Street
- GLADSTONE QLD 4680

**Item 7**: a) Date for practical completion (clause 1)

- OR

- b) Period of time for practical completion (clause 1)

- 9 weeks from Letter of Acceptance

**Item 8**: Governing law (page 5, clause 1 (h))

- Queensland

- If nothing stated, that of the jurisdiction where the site is located

**Item 9**: a) Currency (page 5, clause 1 (g))

- Australian Dollar

- If nothing stated, that of the jurisdiction where the site is located

- b) Place for payments (page 5, clause 1 (g))

- Principal's address

- If nothing stated, the Principal's address

- c) Place of business of bank (page 3, clause 1 (d))

- Gladstone

- If nothing stated, the place nearest to where the site is located

**Item 10**: Bill of quantities (subclause 2.2)

- a) Alternative applying (subclause 2.2)

- Not Applicable

- If nothing stated, Alternative 1 applies

- b) If Alternative 2 applies, is the bill of quantities to be priced?

- If neither deleted, the bill of quantities shall not be priced
(subclause 2.2)
c) Lodgement time
   (subclause 2.3(b))
Not Applicable.
If nothing stated, 28 days after date of acceptance of tender

11 Quantities in schedule of rates, limits of accuracy
   (subclause 2.5 (b))
Upper Limit 120% (Project Specific)
Lower Limit 80% (Project Specific)

12 Provisional sum, percentage for profit and attendance (clause 3)

13 Contractor’s security

a) Form (clause 5)
   Two unconditional “Acceptable Form of Financial Institution Undertaking” each to the value of 2.5% of the Awarded Contract Sum including GST. Refer Special Condition 16.

b) Amount or maximum percentage of contract sum (clause 5)
5% of Awarded Contract Sum

(c) If retention moneys, percentage of each progress certificate (clause 5 and subclause 37.2)
Not Applicable

d) Time for provision (except for retention moneys) (clause 5)
If nothing stated, within 28 days after date of acceptance of tender

e) Additional security for unfixed plant and materials (subclauses 5.4 and 37.3)
No payment will be made for unfixed plant and materials

f) Contractor’s security upon certificate of practical completion is reduced by (subclause 5.4)
50% of amount held
If nothing stated, 50% of amount held

†14 Principal’s security

a) Form (clause 5)
NIL

b) Amount or maximum percentage of contract sum (clause 5)
Not Applicable.
If nothing stated, nil

c) Time for provision (clause 5)
Not Applicable.
If nothing stated, within 28 days after date of acceptance of tender

d) Principal’s security upon certificate of practical completion is reduced by (subclause 5.4)
Not Applicable % of amount held
If nothing stated, 50% of amount held
### Volume 1: General Conditions of Contract as per AS4000-1997 - PART A

**GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN**

*Contract No. 157-17*

<table>
<thead>
<tr>
<th>Document</th>
<th>No. of copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tender Document</td>
<td>1</td>
</tr>
<tr>
<td>Drawings and Information</td>
<td>1</td>
</tr>
<tr>
<td>Schedules and Forms</td>
<td>1</td>
</tr>
</tbody>
</table>

If nothing stated, 5 copies of the drawings, technical specification, bill of quantities or schedule of rates (if any)

<table>
<thead>
<tr>
<th>Time for Superintendent's direction about documents (subclause 8.3)</th>
<th>14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>If nothing stated, 14 days</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subcontract work requiring approval (subclause 9.2)</th>
<th>All work under the Contract, Value &gt; $5,000</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Novation (subclause 9.4)</th>
<th>Subcontractor</th>
<th>Particular part of WUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Subcontractor</td>
<td>Not Applicable</td>
<td>Particular part of WUC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legislative requirements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Those excepted (subclause 11.1)</td>
<td>Nil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Novation (subclause 9.4)</th>
<th>Subcontractor</th>
<th>Particular part of WUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Identified WUC (subclause 11.2(a)(ii))</td>
<td>All work under the Contract</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insurance of the Works (clause 16)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Alternative applying</td>
<td>Alternative One</td>
</tr>
<tr>
<td>If Alternative 1 applies</td>
<td>If nothing stated, Alternative 1 applies</td>
</tr>
<tr>
<td>b) Provision for demolition and removal of debris</td>
<td></td>
</tr>
<tr>
<td>OR % of the contract sum</td>
<td></td>
</tr>
<tr>
<td>c) Provision for consultants' fees</td>
<td>$</td>
</tr>
<tr>
<td>OR % of the contract sum</td>
<td></td>
</tr>
<tr>
<td>d) Value of materials or things to be supplied by the Principal</td>
<td>Nil</td>
</tr>
<tr>
<td>e) Additional amount or percentage</td>
<td>$</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>Paragraph</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>21</td>
<td>Public liability insurance (clause 17)</td>
</tr>
<tr>
<td>a)</td>
<td>Alternative applying ONE If nothing stated, Alternative 1 applies</td>
</tr>
<tr>
<td>b)</td>
<td>Amount per occurrence shall be not less than $20,000,000 any one occurrence If nothing stated, then not less than the contract sum</td>
</tr>
<tr>
<td>22</td>
<td>Time for giving possession 14 days from the date of the Letter of Acceptance of Tender subject to the satisfactory performance of the conditions precedent to Site Possession under the Special Conditions of Contract. If nothing stated, 14 days</td>
</tr>
<tr>
<td>23</td>
<td>Qualifying causes of delay Causes of delay for which EOTs will not be granted (page 3, paragraph (b)(iii) of clause 1 and subclause 34.3)</td>
</tr>
<tr>
<td>24</td>
<td>Liquidated damages, rate This is a predetermined estimate of the cost per day</td>
</tr>
<tr>
<td>25</td>
<td>Bonus for early practical completion (subclause 34.8) a) Rate Not Applicable per day $ per day b) Limit Not Applicable per day $ per day OR % of contract sum If nothing stated, there is no waiver</td>
</tr>
<tr>
<td>26</td>
<td>Delay damages, other compensable causes (page 1, clause 1 and subclause 34.9) Nil</td>
</tr>
<tr>
<td>27</td>
<td>Defects liability period 13 weeks for soft landscaping (excluding trees) and 52 weeks for all other works. If nothing stated, 52 weeks</td>
</tr>
<tr>
<td>28</td>
<td>Progress Claims (subclause 37.1) a) Times for progress claims End of each month for WUC</td>
</tr>
</tbody>
</table>
b) Stages of WUC for progress claims

Unfixed plant and materials for which payment claims may be made (subclause 37.3)

<p>| | |</p>
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<tr>
<th></th>
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<tbody>
<tr>
<td>29</td>
<td>Unfixed plant and materials for which payment claims may be made (subclause 37.3)</td>
</tr>
</tbody>
</table>

30 Interest rate on overdue payments (subclause 37.5)

<p>| | |</p>
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<thead>
<tr>
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<tbody>
<tr>
<td>30</td>
<td>Interest rate on overdue payments (subclause 37.5)</td>
</tr>
</tbody>
</table>

31 Time for Principal to rectify inadequate possession (subclause 39.7)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>Time for Principal to rectify inadequate possession (subclause 39.7)</td>
</tr>
</tbody>
</table>

32 Arbitration (subclause 42.3)

a) Person to nominate an arbitrator

President of the Queensland Chapter of the Institute of Arbitrators and Mediators Australia

If no-one stated, the President of the Queensland Chapter of the Institute of Arbitrators and Mediators Australia

b) Rules for arbitration

Rules 5-18 of the Rules of the Institution of Arbitrators, Australia, for the conduct of Commercial Arbitrations.

Any Arbitration proceedings pursuant to this clause will be conducted in Gladstone, Queensland.

If nothing stated:

a) rules 5-18 of the Rules of The Institute of Arbitrators, Australia for the Conduct of Commercial Arbitrations;

OR

b) If one or more of the parties are nationals of and habitually resident in, incorporated in, or where the central management and control is exercised in, different countries as between the parties, then the UNCITRAL Arbitration Rules shall apply and the appointing authority shall be the person provided in item 32(c)

c) Appointing Authority under UNCITRAL Arbitration Rules

The President of the Queensland Chapter of the Institute of Arbitrators and Mediators Australia

If nothing stated, the President of the Australasian Dispute Centre
The following Clauses have been amended and differ from the corresponding Clauses in AS4000-1997:
9.2, 12, 15.1, 15.2, 25.1, 25.2, 28, 29.3, 34.3, 34.5, 34.9, 37, 37.2, 37.4

In this Annexure, the different styles of type signify:

- **Retained text:** Light type ie shall be deducted from;
- **Deleted text:** small type ruled out ie shall be deducted from;
- **Added text:** Bold type ie. shall be deducted from.

The deletions, amendments or additions to Clauses in AS4000-1997 are set out below:

**9 ASSIGNMENT AND SUBCONTRACTING**

**9.2 Subcontracting**

Third paragraph.

Within 14 days of the **Contractor’s** request for approval, the **Superintendent** shall give the **Contractor** written notice of approval or of the reasons why approval is not given rejection.

**12 PROTECTION OF PEOPLE AND PROPERTY**

Amend paragraph (c)

(c) prevent nuisance and unreasonable noise and disturbance **and other pollution**.

Add new paragraphs between paragraphs 2 and 3.

To the extent that noise and disturbance or other pollution is not the unavoidable consequence of WUC constructing and completing the Works or performing the Contract, the Contractor shall indemnify the Principal, Superintendent and Superintendent’s Representative for and against any liability for damages on that account and against all claims demands proceedings damages costs charges and expenses incurred.

The Principal shall indemnify the Contractor, Superintendent and Superintendent’s representative from and against any liability for damages on account of noise and disturbance or other pollution which is the unavoidable consequence of carrying out WUC and from and against all claims demands proceedings damages costs charges and expenses whatsoever in regard or in relation to such liability.

**15 DAMAGE TO PERSONS AND PROPERTY OTHER THAN THE WORKS**

15.1 Indemnity by Contractor

Delete paragraph (d)

(d) damage which is the unavoidable result of the construction of the Works in accordance with the Contract and

15.2 Indemnity by the Principal

The **Principal** shall indemnify the **Contractor** in respect of damage referred to in paragraph (d) of subclause 15.1 and claims referred to in paragraph e) of subclause 15.1.

**24 SITE**

24.1 Possession

Amend paragraph 1.

Provided the **Contractor** has complied with subclause 19.1 **and the requirements of Special Condition Clause 4**, the **Principal** shall before the expiry of the time in Item 22, give the **Contractor** possession of sufficient of the **site** for commencement of WUC on **site**. If the **Principal** has not given the **Contractor** possession of the whole **site**, the **Principal** shall give the **Contractor** possession of such further portions of the **site** as may, from time to time, be necessary for
carrying out WUC. Subject to subclause 39.7, delay by the Principal in giving possession shall not be a breach of the Contract.

25  LATENT CONDITIONS

25.1 Scope

Amend lines 3 to 7.

(a) Latent conditions are physical conditions on the site or its near surrounds, including artificial things but excluding weather conditions, which differ materially and substantially from those physical conditions which should reasonably have been anticipated by a competent and experienced Contractor at the time of the Contractor's tender if the Contractor had inspected;

25.2 Notification

Amend paragraph a)

(a) The latent condition encountered and the respects in which it differs materially and substantially;

28  MATERIALS, LABOUR AND CONSTRUCTION PLANT

Add the following paragraphs.

The Contractor shall, upon request by the Superintendent, notify the Superintendent in writing of the name and address of the owner of any construction plant used on the WUC at the site and held by the Contractor under an agreement with the owner. The Principal may, in order to avoid seizure by the owner of such construction plant, pay to the owner the amount of any overdue instalment or other sums payable under the agreement. In the event of his doing so he may recover the amount as a debt due from the Contractor.

The Contractor shall ensure that all warranty entitlements arising from the works include the Principal and the Contractor as named beneficiaries. Such warranties shall be in a form approved by the Superintendent and shall be submitted to the Superintendent prior to the issue of the final payment certificate.

29  QUALITY

29.3 Defective Work

Add the following paragraph:

The Contractor shall not be entitled to rely upon any inspections or tests carried out for their own purposes by the Principal or Superintendent.

34  TIME AND PROGRESS

34.3 Claim

Add new paragraph:

The Contractor shall not be entitled to any payment arising from the granting of an extension of time over and above any payment to which he is entitled under the Contract for the event that has caused such extension of time.

34.5 Extension of Time

Amend as follows.

Notwithstanding that the Contractor is not entitled to or has not claimed an EOT, the Superintendent may at any time and from time to time before issuing the final certificate direct an EOT and there shall be no payment to the Contractor because of granting of such extension of time.

34.9 Delay Damages

Amend by adding new paragraph:
Payment for such delays shall not include an allowance for profit. (Actual costs to be demonstrated)

37 PAYMENT

Amended by inserting the following paragraph to follow line 14-

“The certificates referred to in paragraphs (a) and (b) may be incorporated into one certificate”.

37.2 Certificates

Amend paragraph 4 as follows;

The Principal shall within 14 days after receiving both such certificates, or within 30 days after the Superintendent receives the progress claim, pay to the Contractor the balance of the progress certificate after deducting retention moneys and setting off such of the certificate in paragraph (b) as the Principal elects to set off. If that setting off produces a negative balance, the Contractor shall pay that balance to the Principal within 7 days of receiving written notice thereof.

37.4 Final Payment Claim and Certificate

Amend paragraph 3 as follows;

Those moneys certified as due and payable shall be paid by the Principal or the Contractor, as the case may be, within 14 days after the debtor receives the final certificate.
SPECIAL CONDITIONS OF CONTRACT

1 PRECEDENCE OF DOCUMENTATION

In the event of any inconsistency or contradiction between the documents comprising the Contract the following order of priority of interpretation shall prevail:

Volume 1 - Conditions of Contract
- The Letter of Acceptance
- Formal Instrument of Agreement
- Special Conditions of Contract
- General conditions of contract (AS 4000 - 1997)
- Annexure to the General Conditions of Contract
- Any notices to tenderers, with more recent notices taking precedence
- Post Tender Correspondence

VOLUME 2 – Technical Specifications
- General Specifications (sourced from Natspec, & including but not limited to)
  - Management Plans
    - 0136 General Requirements (Construction)
    - 0161 Quality (Construction)
    - 0173 Environmental Management
    - 0257 Landscape - Road Reserve and Street Trees
    - 0310 Concrete - combined
    - 1101 Traffic Management
    - 1102 Control of Erosion and Sedimentation (Construction)
    - 1111 Clearing and Grubbing
    - 1152 Road Opening and Restoration
    - 1361 Sewerage Network - Reticulation (Construction)
- Capricornia Municipal Design Guidelines - D12 - Sewerage Network
- Refer to the Specifications on the Project Drawings

VOLUME 3 – Drawings and Schedules
- Project Drawings
  - 16-047-000 - Cover Sheet, Locality Plan and Drawing Index
  - 16-047-001 - Standard Notes
  - 16-047-002 - Alignment set out details
  - 16-047-400 - General layout
  - 16-047-401 - Plan and Section Details sheet 1 or 3
  - 16-047-402 - Plan and Section Details sheet 2 or 3
  - 16-047-403 - Plan and Section Details sheet 3 or 3
Volume 1: Special Conditions of Contract
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN
Contract No. 157-17

- 16-047-404 - Rising Main Details
- 16-047-405 - General Details

- Supplementary Standard Drawings
  - CMDG-W-041 - Water Main Thrust Block Details
  - CMDG-S-073 - Scour Valves Construction Details
  - CMDG-S-090 - Sewer Construction, Pipeline Construction Types
  - CMDG-W-060(D) - Hydrants and Valve Installation
  - CMDG-W-061(C) - Hydrants and Valve Surface Boxes
  - WAT-1209 - Trench Drainage Bulkheads & Trenchstop

VOLUME 4 – Tender Submission Documents

- Tender Submission Documents
- The Schedule of Rates
- Construction Program
- Demonstration of Understanding Statement/Methodology

The Principal does not guarantee that the information contained in any of these documents is accurate or complete and the Tenderer must make their own assessment as to the validity of the information when preparing the Tender.

In the event that the aforesaid order of precedence of Contract Documents cannot be reasonably applied, or in the event that when that order of precedence is applied some doubt arises as to the resolution of any differential matter or thing, as between any two or more of the said Documents, then the Superintendent shall be the sole arbiter as to which Contract Documents shall apply to that matter or thing.

2 WORK HEALTH AND SAFETY

Gladstone Regional Council is committed to providing a safe and healthy working environment for their employees, contractors and visitors to the workplace. Adopting and promoting the provisions of the Work Health and Safety Act 2011 and its associated Regulations, Codes of Practice and Australian Standards is paramount. All employees, contractors, labour hire staff and visitors to the workplaces are to follow safe work practices as prescribed under the legislation and in Council’s Policies and Safe Work Procedures. Provide adequate resources to manage and maintain health and safety together with regular training on workplace health and safety.

The Contractor shall comply with and ensure that its employees, subcontractors and their employees comply with all provisions of the Work and Safety law. The Work and Safety Law means:

(a) Work Health and Safety Act 2011 (QLD) as amended from time to time; and
(b) Any legislation addressing work health and safety as amended from time to time.

The Contractor shall also comply with Gladstone Regional Council WH&S policies and procedures which are in any way applicable to this contract. The Contractor shall sign and lodge all forms and pay all fees associated with the Principal Contractor's responsibilities under the said Act. The Contractor shall be the Principal Contractor and shall assume all responsibilities of the Principal Contractor as defined by the Law in respect of the Site:

(a) From the date of the Contractor assuming Possession of Site; and
(b) Until the earliest of:
Volume 1: Special Conditions of Contract
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN
Contract No. 157-17

(i) 4:00pm on the Practical Completion, unless otherwise specified under the Contract;
(ii) termination of the Contract; or
(iii) notice from the Superintendent revoking appointment.

The Contractor shall:

(a) Prepare a “Work Health and Safety Plan” ("Plan") as required by the Work and Safety Law and defined under the accompanying regulations; and
(b) Submit the Plan to the Superintendent for review and acceptance:
   i. within 10 working days of commencement of contract; and
   ii. prior to taking Possession of Site.

The Superintendent may at any time request amendment of the Plan. The Contractor shall forthwith amend the Plan in accordance with the Superintendent’s request or provide written justification as to why the Plan should not be amended.

The Contractor shall prepare and present a work health and safety plan including a site specific risk analysis for the contract works to the Superintendent for approval. Obtaining approval may involve interactive analysis of the risk assessment, works method and program with the Superintendent and the Council’s Work Health and Safety officer.

The Contractor must ensure that all workplace staff are competent in the work being undertaken. The Contractor will provide the employees and Sub-Contractors/Labour Hire staff with information and supervision in relation to hazardous work processes or material/s.

The Contractor shall ensure that all equipment used during the operation of this contract is safeguarded at least in accordance with the manufacturers’ specifications.

The Contractor will comply with any reasonable direction given by the Superintendent relating to WH&S.

If, during the performance of work under the contract, the Superintendent informs the Contractor that it is their opinion the Contractor is:

(a) Not conducting the work in compliance with the WH&S Legislation or relevant policies and procedures: or

(b) Conducting the work in such a way as to endanger the health and safety of the Contractor's employees, Gladstone Regional Council employees or the general public, the Superintendent may direct the Contractor to promptly remedy the breach of WH&S or may direct the Contractor to suspend work until such time as the Contractor satisfies the Superintendent the work will be resumed in a safe manner. If the Contractor fails to rectify any breaches of WH&S for which work has been suspended, or if the Contractor's performance has involved recurring breaches of WH&S, the Superintendent will notify Workplace Health and Safety Queensland and request that an inspector visit the workplace or, they may terminate the work forthwith (depending on the severity of the issue).

The Contractors employees shall:

(a) Undertake Site Specific Safety Inductions on arrival to site.
(b) Have immediately available to him/her appropriate Australian Standard approved Personal Protective Equipment (PPE) which shall be worn and/or fitted as appropriate for the task being undertaken, or as directed by workplace management. As a minimum, Contractor employees are required to wear the following PPE on any Council worksite:

- Long sleeve shirts;
• High-viz shirt or vest;
• Safety footwear;
• Wide brimmed hat; and
• Sunscreen.

(c) Have immediately available to him/her on site the current Material Safety Datasheets (MSDS) for all hazardous substances expected to be used in performance of their duties.

Fuels and combustibles kept on site shall be stored in accordance with current Australian Standards.

Smoking is not permitted in buildings or within four (4) metres of any entrance to a building occupied by the Council. Smoking on the site in general to be in accordance with Qld legislation.

All persons including the Contractor and the Contractor's Sub-Contractor/Labour Hire staff engaged to perform a service are subject to random drug and alcohol testing when carrying out work on a Gladstone Regional Council site.

3 MATERIALS TO BE PROVIDED BY THE PRINCIPAL

No materials will be provided by the principal.

4 POSSESSION OF SITE

Prior to commencement of any works, a pre-start meeting shall be organised by the Contractor and/or by the Superintendent. The pre-start meeting is to be attended by the Superintendent, Representative of the Principal, Contractor and any relevant Specialist Consultants or Authorities.

No works on site will be permitted to commence until the following information has been submitted to the Superintendent for review and approval (within nominated time).

• Evidence of required Insurances (including certificates of currency): (By Contractor)
  o Public Liability
  o Workers Compensation
  o Contract Works Insurance (and nominate the excess for making a claim)
  o Vehicle and Plant Insurance

• Approvals (By Contractor) - including but not limited to:
  o Dial B4 U Dig
  o Liaison with GRC Water Operation to do Gladstone Wastewater Treatment Plant (WWTP) connection into the distribution tower
  o Liaison with Department of Transport and Main Roads for "Approval to Work" permit for under bore of Hansen Road and works within the road reserve
  o Liaison with GAWB for "Approval to Work" permit
  o Liaison with Jemena for "Approval to Work" permit
  o Environmental approvals for removal of "remnant vegetation" with Gladstone WWTP boundary
  o Liaison with NRG for approval to work within their property

• Works Program; (By Contractor)
Volume 1: Special Conditions of Contract
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN
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- Anticipated monthly invoice/cash flow
- Acceptable form of Financial Institution Undertaking

The following plans as required by the Contract Conditions and / or Specifications:

- Environmental management plan
  - Soil erosion and sediment control plan
  - Waste management plan
  - Ground contamination control plan
- Work health and safety plan;
- Traffic Management Plan (TGS - to MUTCD standard per work on road permit sufficient);
- Quality Plan including organisation chart and contact details.
  - Inspection and Test Plans - that identify key activities and are deemed an acceptable standard after Superintendent review

The Contractor will have been deemed to have made allowance for the above in his program. The Contractor will not be granted any Extension of Time to the contract for his failure to provide the required information. Exemption of any of any of the above requirements or acceptance of part plans relevant to upcoming works will be at the discretion of the Superintendent.

5 PUBLICITY
The Works under the contract are a confidential matter between the Principal and the Contractor. The Contractor shall not make any media release or other public statement without written approval from the Principal. The Contractor shall make allowance to supply and install two colour project signs.

6 WORK HOURS
Normal work hours Monday to Friday 6:30am to 6:00pm. Work outside these hours can only be carried out with the prior approval of the Superintendent, which shall not be unreasonably withheld.

7 NOTICE OF INSPECTION
The Contractor shall give the Superintendent not less than twenty-four (24) hours' notice of their intention for an inspection of a witness or hold point to be undertaken where not already stated.

8 RISE AND FALL
The Contract Sum shall not be subject to adjustment for Rise and Fall.

9 QUALITY MANAGEMENT
9.1 Requirement
The Contractor shall implement a quality management system under this Contract in accordance with the requirements of AS/NZS ISO 9001.

9.2 Quality Management Representative
The Contractor shall nominate a suitably qualified Quality Assurance Representative (QAR) who has authority to effectively control the Quality System as implemented on the site.
9.3 Quality System Documentation

The Contractor shall submit to the Superintendent a copy of the following documents within 14 days of the date of the letter of acceptance or prior to possession of site:

(a) Quality System Certification to AS/ISO 9001;
(b) Corporate Quality Manual (for review and return to the Contractor); and
(c) Two controlled copies of the Project Quality Plan.

The Contractor shall also provide the Superintendent with access to inspect Corporate Quality Procedures applicable to this Contract.

The Project Quality Plan shall follow the guidelines of interim Australian and International Standard AS/NZS ISO 9004.5 (Part 5). Guidelines provided by Australian Standard AS/NZS ISO 3905 shall also apply.

As a minimum, the Project Quality Plan shall contain the following information:-

(a) A Project Organisation Chart or list of nominated Project Personnel showing their positions, lines of communication and details of the responsibilities of the positions;

(b) Details of the qualifications and experience and contract details of the following positions:
   i. Project Manager;
   ii. Construction Manager;
   iii. Project Engineer;
   iv. Contractor’s Quality Representative (QAR);
   v. Surveyor;
   vi. Foreman, Supervisor(s); and
   vii. After hours contact.

(c) A Lot Plan, or the methods by which lots will be identified;

(d) Inspection and Test Plans & checklists for the various phases during manufacture, construction and commissioning, as applicable to the project, to be submitted at least 7 days prior to commencement of relevant activity;

(e) A copy of the NATA Terms of Registration for the Contractor’s Compliance Testing Laboratory (Internal or Sub-Contract);

(f) Project specific operating procedures or descriptions outlining as a minimum, details of activities, who is responsible for implementation/verification, identification of relevant Quality Records and distribution and of such records, to be submitted at least 7 days prior to commencement of relevant activities; and

(g) A Register of all intended Quality Records to be used on the project, together with proformas.

9.4 Inspection and Test Plans

Inspection and Test Plans shall contain at least the following information for each significant activity identified in the relevant process:

(a) Description of activity;

(b) Specification requirements/reference; (including frequency of testing)

(c) Person responsible for activity (title);

(d) Hold Points and Witness Points;
9.5 Identification and Traceability

All work under this Contract including manufacture, site construction and commissioning, shall be subdivided into distinct work lots or work items. Work lots or work items shall be chosen by the Contractor, consistent with any specified requirements, but shall be subject to approval by the Superintendent.

Each work lot or work item shall be assigned a unique identification number, and the Contractor shall maintain a register of all allocated work lot or work item numbers. This register shall contain as a minimum, the following information:

(a) Brief description of the work lot or work item;
(b) Location reference (3 dimensional where applicable); and
(c) Lot or item status (conforming or non-conforming).

The Contractor shall ensure that traceability is maintained throughout all documented records under this Contract. All test results where applicable under this Contract shall be positively identified with their respective work lot or work item number. The Contractor shall notify the Superintendent in writing 24 hours prior to commencing a new work lot or work item.

9.6 Conformance Reports

Conformance Reports shall be made available to the Superintendent for each designated work lot or work item, within 24 hours of completion of the work lot or work item.

**Conformance Reports are a pre-requisite to payment for the work (i.e. It is a requirement to submit quality records with or prior to the progress claim in order for payment for relevant items).**

Conformance Reports shall include a verification statement certifying that the relevant work lots or work items have been inspected and/or tested in accordance with the Contractor’s Inspection and Test Plan(s) applicable to this Contract and that they comply with the specified requirements of the Contract Documents.

Conformance Reports shall be accompanied by the following documents:

(a) All relevant signed off Inspection and Test Plans and associated Checklists; and
(b) NATA certified compliance test results (where applicable).

Note:

In cases where test results are not available within this period (eg. 28 day concrete strengths), the Contractor shall submit preliminary results or previous analytical data of the same mix type which statistically indicates a high probability of conformance. Submission of
such information does not absolve the Contractor from its responsibilities under this Contract should actual results subsequently identify nonconformance of the work lot or work item.

(a) Survey and measurement compliance data (where applicable).

In any statement of an amount for payment in a Progress Certificate issued under the General Conditions of Contract, the Superintendent shall not be obliged to include in any such certificate, and the Principal shall not be obliged to pay for, any work for which evidence of conformance has not been submitted as set out in this clause.

Certification and payment shall not be unreasonably withheld, however, where the relevant evidence of conformance has not been submitted due only to the normal delays in processing, testing, analysis and reporting. In this case the Contractor’s payment claim shall set forth the lots claimed for payment but for which conformance reports have not been submitted and certifies that conformance reports for those lots will be submitted prior to the next payment claim.

9.7 Nonconformance Reports

The Contractor shall submit a Nonconformance Report to the Superintendent within 24 hours of detecting nonconforming work. The Contractor’s Nonconformance Report shall clearly detail but not be limited to the following items:

(a) The nature and extent of the nonconformance;
(b) The work lot or work item number it relates to including the precise boundaries of the nonconforming work;
(c) Any relevant information, data, test results and/or measurements (as applicable);
(d) The corrective and preventive actions the Contractor proposes to take; and
(e) The time frame within which the nonconformance will be rectified.

The method of isolating/identifying nonconforming work, applying and releasing hold points, etc, shall be clearly stated in the Project Quality Plan.

The proposed corrective action shall be subject to approval by the Superintendent.

9.8 Default by the Contractor

Failure by the Contractor to submit either a Conformance Report or a Nonconformance Report within the nominated time frame shall constitute a substantial breach of the Contract and may, at the Superintendent’s discretion, be subject to a stop work order. As a result of such action by the Superintendent, and in addition to the Contractor’s responsibility to rectify the nonconforming work, the Contractor shall be responsible for its own costs for any time delays due to such breach of Contract.

9.9 Hold Points and Witness Points

A Hold Point is defined as a position in the progress of the work under Contract, beyond which further work shall not proceed without mandatory verification by the QAR or the Superintendent.

Mandatory Hold Points shall include those specified and shall apply to this Contract to ensure compliance with the intent of the designs and with other specified requirements, and to ensure that critical and/or irreversible activities are not constructed incorrectly.

Mandatory Hold Points shall apply prior to commencement of designated work lots or work items.

To obtain authorisation to proceed, the Contractor shall ensure that all work lots or work items affected by the lot or item in question are conforming;
A Witness Point is defined as a position in the progress of the work under Contract, where the Contractor must notify its QAR, the Superintendent prior to proceeding and the option for attendance for witnessing of inspection and test may be exercised. If any do not attend, then work may nevertheless proceed, unless otherwise instructed.

Witness Points shall apply to verify compliance of the constructed works with the approved design drawings.

Witness and hold points are to be submitted for review and non-rejection by the Superintendent.

As a minimum the following witness and hold points are required:

**Witness Points**
- Trench excavation
- Back filling of trenches
- Testing of pipeline
- Prior to forming thrust block and confirmation of bearing pressure of insitu material
- Prior to pouring thrust block

**Hold Points**
- Approval of ITP's prior to works commencing
- Connection to Gladstone WWTP distribution tower
- Works in vicinity of Jemena gas main

Depending on approvals the Gladstone Area Water Board (GAWB) and Jemena may also wish to attend or be on site throughout construction. The Contractor shall coordinate with GAWB and Jemena for their desired frequency to be onsite.

9.10 Compliance Inspections and Testing

All compliance inspections and tests shall be based on work lots or work items unless otherwise specified in the contract documents. The costs for all such inspections and tests shall be borne by the Contractor and included in the Contract Sum.

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

The Contractor shall advise the Superintendent of the work lot or work item number and the location within the lot or item, prior to any testing of the lot or item.

The Contractor shall submit a Nonconformance Report and the proposed corrective action for any nonconforming test result. No further testing shall be permitted until approval by the Superintendent.

For compliance inspections the Contractor shall nominate responsible persons, who are not directly involved in performing the work.

The frequency of compliance testing shall be in accordance with the minimum requirements of the Contract Documents.

The Contractor shall submit to the Superintendent any preliminary results on compliance tests carried out for each work lot or work item with 24 hours of completion of tests.

9.11 Subcontracted Work
The Contractor shall ensure that subcontracted works and procured supplies are subject to appropriate quality assurance standards, when incorporated into the works in order to comply with the requirements of this Contract.

If requested by the Superintendent, the Contractor shall provide evidence of appropriate quality assurance for subcontracted work or procured items incorporated into the works under this Contract. This shall include verification by the Contractor.

9.12 Quality Records

The Contractor's quality system shall include sufficient quality records to provide objective evidence that the requirements of the Contract are met. This shall include Subcontractors and Suppliers records relevant to this Contract.

The Contractor shall, when requested by the Superintendent, provide access to all quality records relevant to the Contractor's quality system under this Contract.

Within 28 days of the Date of Practical Completion, the Contractor shall forward a complete and bound clean copy of at least the following records to the Superintendent. Previously submitted documents may be selected as appropriate.

(a) The Work Lot or Work Item Register for the Contract;
(b) All Conformance and Non-conformance Reports;
(c) All Inspection and Test Plans and associated Checklists;
(d) All Test Results, analyses, reports, measurements and observations; and
(e) The original Project Quality Plan and any changes made to the Contractor's Quality System.

Records shall be maintained by the Contractor for a minimum period of two years from the Date of Completion or in accordance with the Contractor's statutory requirements if the latter exceeds the minimum period required for this Contract.

Records for equipment and parts subject to inspection and approval by the relevant regulatory authority shall be made available on site at the time of arrival of all relevant items at site, or after inspections have been carried out on site (if applicable).

9.13 Quality Audits

The Contractor shall submit an audit schedule to the Superintendent at the time of submission of the Contractor's Quality System documentation. This shall include internal audits and external audits on Suppliers and Subcontractors.

The Contractor shall carry out at least one audit on each of these groups, over the duration of the Contract, and submit all audit records including objective evidence for any necessary follow up corrective actions attached to close out corrective action reports.

10 INSPECTION, TESTING AND TESTING FEES

The Superintendent shall have the right to enter for the purpose of inspection and testing at any time during working hours any premises where articles for inclusion in the works are being manufactured or stored. The Contractor shall afford the Superintendent every opportunity to inspect any article which is manufactured or stored off-site prior to delivery to the site for inclusion in the works.

The Contractor shall supply all labour and equipment and render all assistance required to enable carrying out of all tests and inspections which are necessary for the purposes of this Contract. The Contractor shall perform all inspections and tests required by the Contract and such other inspections and tests as are necessary for proper compliance with the Project Quality Plan and good construction practice.
The Superintendent reserves the right to order additional samples and testing to satisfy itself that the requirements of the Contract are being met. The Contractor shall arrange for carrying out of testing and/or the obtaining of samples by a testing Authority nominated by the Superintendent. In the event that the tests indicate compliance with the requirements of the Contract, payment will be made for testing on a prime cost basis. The Contractor shall be responsible for the costs of all testing which demonstrates that the works do not comply with the requirements of the Contract.

If the Contractor fails to perform any of the foregoing obligations with regard to testing, the Principal shall be at liberty to perform undertake any testing or inspection at the Contractor’s works or elsewhere, and all costs and expenses incurred in the matter shall be payable by the Contractor to the Principal on demand, or may be deducted and retained by the Principal from monies due or that may become due to the Contractor under the Contract.

11 ACCESS TO PRIVATE PROPERTY

All works carried out on private property shall be completed with a minimum of disturbance and inconvenience to the occupant. The successful contractor will be supplied identification cards by the Council to its project staff to enter upon and work on Council roads or private property. For accessing to a private property, the Superintendent will provide a copy of the notice which is to be delivered to the residents by the contractor at least 48 hours prior to the works being undertaken. However, if any changes are required due to factors beyond reasonable control, the Contractor shall notify to the resident and the Superintendent.

The Contractor shall return the identification cards to Council immediately after the project is completed.

The Contractor is to obtain suitable permission/permits to work with NRG owned land.

12 USE OF WATER FROM PRINCIPAL'S WATER MAINS

The Contractor may use water direct from the water mains and is required to utilise a metered hydrant standpipe issued by the Principal for this purpose, however before approval is given for the mains to be accessed, the Contractor shall ensure that:

- A bond is to be lodged with Council prior to the standpipe being issued. The bond is refundable upon return of the standpipe in good working order as determined by the Superintendent. Any repairs required as a result of damage or misuse by the Contractor will be deducted from the bond.
- The Contractor shall pay per kilolitre of water used (rate to be advised upon payment of bond)

13 SPOIL MATERIAL

All spoil generated as part of the project shall be disposed of legally.

14 PHOTOGRAPHY

The Contractor consents to the collection and use of personal information of its employees; namely photographs or videos which may be used in promotional material including videos, catalogues, magazines, newspaper articles, brochures and the Principal's website. The information will only be accessed by authorised employees in relation to the above use and will not be given to any other person or agency other than for the purpose of the preparation of the promotional material unless the Contractor gives permission or as required by law.

15 VALVES & EXISTING SEWER SYSTEM

Under no circumstances is the successful Tenderer / Contractor to operate the valves in the existing network. The Water Service Provider shall be the only entity that will operate valving
in the existing network. All cut ins to the existing system (both Water and Sewer) shall be by agreement and planned with the knowledge and written approval of the Water Service Provider. Refer CMDG D12.24 “Connection to existing Network”. 5 days’ Notice to be provided including approved methodology of cut ins.

16 CONTRACTORS SECURITY

The Acceptable form of Financial Security Undertaking is per Gladstone Regional Council Policy P-2015/16 “Financial Institution Undertakings”. The Tenderers are to allow for all costs of obtaining and servicing this form of undertaking within their tender.

17 QLEAVE LEVY

The payment of Q Leave levies will be by the Principal

18 DAILY REPORT

A daily report is required during construction. Report shall include the following as a minimum

- Details of work performed;
- Photos of work performed;
- Work Location/s, Date, Weather Conditions;
- General comment;
- Materials delivered;
- Delays, Issues, Concerns; and
- Work planned next day.

19 AS CONSTRUCTED DRAWINGS

Always maintain a spate set of drawings on Site to mark-up changes and to record administrative information. Record every change of the Works from what is shown on the Works Description drawings, variation drawings and Consultant Design drawings. Clearly delineate all amendments from the original Works Description.

Design drawings can be provided to the Contractor to prepare As Constructed drawings on the basis the Contractor signs a consent form relieving the designer of the responsibility for the drawings. The electronic drawings may not look like the PDF copy issued and may have title blocks removed.

The Contractor shall prepare As Constructed plans which are records of information issued for construction and also includes information recorded during and after construction including site directions, service locations, variation, hidden works and the like. These shall be certified by a Licensed Surveyor engaged by the Contractor.

The As Constructed Drawings shall be submitted in:

a. Hard copy; and

b. Digital for (the design drawings are available as a base to the Contractor from the Principal. The Contractor is responsible for editing the drawing from the format in which they are provided). AutoCAD 2008 or later with all XREF and OLE files bound to the final file. Correctly georeferenced to MGA94 Zone 56, AHD and be in true ground distance. Plans are not to be submitted on an arbitrary datum, assumed level control or scaled. The plans should be submitted in metres. The electronic plans are to be updated to show the true location of the built asset, not the designed position.

The digital form shall be provided on a USB or CD-ROM or alternative medium approved by the Superintendent.
The positions of all structure and key features shall be referenced to the horizontal and vertical datum.

The drawings are to be provided to the Superintendent within 14 days of Practical Completion.
TECHNICAL SPECIFICATIONS

GLADSTONE REGIONAL COUNCIL

CONTRACT No. 157-17

QUALITY ASSURED, SCHEDULE OF RATES CONTRACT
for the
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

VOLUME 2 of 4

TECHNICAL SPECIFICATIONS

PREPARED BY: COUNCIL’S ENGINEERING SERVICES SECTION
DATE: February 2017
1 TECHNICAL SPECIFICATIONS

1.1 CONSTRUCTION SPECIFICATIONS
The construction specifications and references to the standards are as listed in the project drawings and this document. These include but are not limited to:
- NATSPEC specifications
- Capricornia Municipal Design Guidelines (CMDG) standards
- Water Services Association of Australia (WSAA) standards

1.2 0136 - GENERAL REQUIREMENTS (CONSTRUCTION)
Refer to technical specification within this document.

1.3 0161 - QUALITY (CONSTRUCTION)
Refer to technical specification within this document.

1.4 0173 - ENVIRONMENTAL MANAGEMENT (AUS-SPEC)
Refer to technical specification within this document.

1.5 0257 - LANDSCAPE - ROAD RESERVE AND STREET TREES
Refer to technical specification within this document.

1.6 0310 - CONCRETE COMBINED.
Refer to technical specification within this document.

1.7 1101 - TRAFFIC MANAGEMENT
Refer to technical specification within this document.

1.8 1102 - CONTROL OF EROSION AND SEDIMENTATION (CONSTRUCTION)
Refer to technical specification within this document.

1.9 1111 - CLEARING AND GRUBBING
Refer to technical specification within this document.

1.10 1152 - ROAD OPENINGS AND RESTORATION
Refer to technical specification within this document.

1.11 1361 - SEWERAGE SYSTEMS - RETICULATION (CONSTRUCTION)
Refer to technical specification within this document.

1.12 CAPRICORNIA MUNICIPAL DESIGN GUIDELINES - D12 - SEWERAGE NETWORK
Refer to technical specification within this document.
0136 GENERAL REQUIREMENTS (CONSTRUCTION)

1 GENERAL

1.1 RESPONSIBILITIES

General Requirement: Provide labour, materials, plant and equipment to construct the Works, as documented.

1.2 PRECEDENCE

General Worksections and referenced documents:
- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of the worksections override conflicting requirements of their referenced documents.
- The requirements of referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0152 Schedule of rates (Construction).
- 0161 Quality management (Construction).
- 0173 Environmental management (AUS-SPEC).
- 1101 Traffic management.
- 1196 Boundary fencing for road reserves.

Cross referencing
Within the text:
- Worksection titles are indicated by *Italicised* text.
- Clause titles are indicated by **BOLD** text.

Hold and witness points
General: With the text keyword followed by a colon are the same as the subclause of the associated text.

1.4 REFERENCED DOCUMENTS

Contractual relationships
General: Responsibilities and duties of the principal, contractor and superintendent are not altered by requirements in the documents referenced in this specification.

Current editions
General: Use referenced documents (including test methods) which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

1.5 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- AS: Australian Standard.
- BIM: Building Information Modelling.
- CAD: Computer Aided Design.
- ICSM: Intergovernmental Committee on Surveying and Mapping.
Definitions

General: For the purposes of this contract the definitions given in AS 1348, AUSTROADS AP-C87 and the following apply:

- Approved: Approved, reviewed, directed, rejected, endorsed and similar expressions mean approved (reviewed, directed, rejected, endorsed) in writing by the superintendent.
- Authorities: Includes agencies.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the superintendent.
- Hold Point: A mandatory verification position in the contract beyond which work cannot proceed without the designated authorisation.
- Local (government) authority: A body established for the purposes of local government by or under a law applying in a state or territory.
- Manufacturers’ and suppliers’ recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer relating to the suitability, use, installation, storage and/or handing of a product.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the superintendent.
- Permanent marks: Survey control marks that are permanent by nature and are uniquely defined in the state control survey. Also known as State survey marks (SSM) or Bench marks (BM).
- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the Works.
- Professional engineer: A person who is listed or eligible for listing on the National Professional Engineers Register (NPER) and has appropriate experience and competence in the relevant discipline at the relevant time.
- Progressive inspections: Inspections that are required progressively on a component during the course of the project.
- Proprietary: Identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions mean supply and install and include development of design beyond that documented.
- Registered testing authority:
  - An organisation registered by NATA to test in the relevant field; or
  - An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
  - An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- Required: Required by the documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or be a legislative requirement.
- Statutory authority: A public sector entity created by a specific law of the Commonwealth, State or Territory.
- Superintendent: Superintendent has the same meaning as contract administrator or principal’s representative.
- Supply: Supply, furnish and similar expressions mean supply only.
- Survey mark: A survey peg, bench mark, reference mark, signal, alignment, level mark or any other mark used or intended to be used for the purpose of setting out, checking or measuring the work.

- Tests – completion: Tests carried out on completed installations or systems and fully resolved before the date for practical completion, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The superintendent may direct that completion tests be carried out after the date for practical completion.

- Tests – pre-completion: Tests carried out before completion tests.
  - Production tests: Tests carried out on a purchased item, before delivery to the site.
  - Progressive: Tests carried out during installation to demonstrate performance in conformance with the specification.
  - Site tests: Tests carried out on site.
  - Type tests: Tests carried out on an item identical with a production item, before delivery to the site.

- Tolerance: The permitted difference between the specified value and the upper limit and the lower limit of dimension, value or quantity.

- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

- Witness point: A nominated position in the manufacture/construction stages of the contract where the option of attendance may be exercised by the superintendent, after notification of the requirement.

1.6 CONTRACT DOCUMENTS

Services diagrammatic layouts
General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:
- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

Levels
General: Spot levels take precedence over contour lines and ground profile lines.

1.7 SUBMISSIONS

Requirement
General: Submit the following, as documented:

- Authority approvals: Notes of meetings with authorities whose requirements apply to the work and evidence that notices, fees and permits have been sought and paid, that authority connections are complete and that statutory approvals by the authorities whose requirements apply to the work have been received.

- Certification: Certification of conformance to documented requirements.

- Design: Design data and certification of proposed work, if required and as documented.

- Materials: Products and materials data, including manufacturer's technical specifications and drawing, evidence of conformance to product certification schemes, performance and rating tables and installation and maintenance recommendations.

- Work-as-executed drawings: To EXECUTION, WORK-AS-EXECUTED DRAWINGS.

- Samples: Representative of proposed products and materials and including proposals to incorporate samples into the Works, if any to EXECUTION, SAMPLES.

- Shop drawings: To EXECUTION, SHOP DRAWINGS.

- Substitutions: To MATERIALS, GENERAL, Substitutions.

- Tests:
  - Inspection and testing plan consistent with the construction program including details of test stages and procedures.
  - Certificates for type tests.
Test reports for testing performed under the contract to EXECUTION, TESTS.

Contractor review: Before submissions, review each submission item and check for coordination with other work of the contract and conformance to contract documents.

Submission: To the superintendent.

**Execution details**

**Working area and site facilities:**
- Site facilities: Submit a proposal for positioning of all units, services including septic or sewer, rubbish collection, storage areas and security fencing.
- Alternative site facilities: Submit proposal with full details for the use of alternative site facilities in existing buildings.

Adjoining property: Submit one endorsed copy of each record of adjoining property inspection.

Signage: Submit all safety and project signs for approval before sign manufacture or purchase.

Alternative construction: Submit detailed working drawings, design calculations and specifications and certification by a Professional Engineer experienced in the alternative construction design, verifying conformance of the design.

**Submission times**

Default timing: Make submissions at least 5 working days before ordering products or starting installation of the respective portion of the Works.

Submission response times: Allow in the construction program for at least the following times:

1. **Identification**
   - Requirement: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include relevant contract document references. Include service connection requirements and product certification.
   - Non-conformance: Identify proposals that do not conform with project requirements, and characteristics which may be detrimental to successful performance of the completed work.
   - Errors: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission.

2. **INSPECTIONS**

**Notice**

General: Give notice so that inspection may be made of the following:
- Items to be supplied by the principal: Delivery to site.
- Existing utility services: Discrepancies from documented location.
- Relocation and alterations to existing utility services: Proposed removal, diversion or cutting into existing service.
- Supplied survey setting out information: Transfer of survey marks.

**Attendance**

General: Provide attendance for documented inspections and tests.

Underground works: If notice of inspection is required for parts of the works that are to be concealed, advise when the inspection can be made before concealment/backfilling.

2. **MATERIALS**

2.1 **GENERAL**

**Manufacturers’ or suppliers’ recommendations**

General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in conformance with the recommendations of the manufacturer or supplier.

Proprietary items/systems/assemblies: Assemble, install or fix in conformance with the recommendations of the manufacturer or supplier.
Project modifications: Advise of activities that supplement, or are contrary to the recommendations of the manufacturers or supplier.

**Sealed containers**

General: If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

**Sources policy**

**Prohibited materials**

General: Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia Hazardous Substances Information System (HSIS).

**Substitutions**

Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the identified item, but indicates the necessary properties of the item.

Alternatives: If alternatives to the documented products and materials, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives, including the following:

- Evidence that the performance is equal to or greater than that specified.
- Evidence of conformity to a cited standard.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the Works.

Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence.

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effective as the identified item, detail or method.

Costs: Pay the cost of submissions and of evaluations and tests of proposed alternatives, whether subsequently adopted or not. The costs will be calculated at the current charge-out rates of the relevant consultant(s).

### 2.2 ITEMS TO BE SUPPLIED (TBS) BY THE PRINCIPAL

**General**

Requirement: Items listed in the **Items to be supplied by principal schedule** will be supplied free of charge to the contractor for installation in the Works. Unload and take delivery, inspect for defects and take care of the TBS items. Return unused items to the principal.

Time of delivery: Give notice of the required time of delivery for TBS items.

Damaged or defective: Give notice of any TBS item found damaged or defective within 2 days of taking delivery. If the contractor does not report damage or defect it is deemed that the TBS item was free from damage or defect when received and the contractor is responsible for any replacement or making good.

Storage: Store, protect and insure of all TBS items received.

**Pipe culverts supplied by the principal**

Time of delivery: Give 30 days notice of the required time of delivery.

Supplied: Pipe culverts are supplied by the principal at no cost to the contractor for the actual length laid of pipe culvert required under the contract.
Additional pipe culverts: If any pipe culverts are required in addition to those supplied, it is the responsibility of the contractor to supply at no cost to the principal.

No Items to be provided by Principal

3 EXECUTION

3.1 THE SITE

Protection of the environment
General: Adhere to the requirements of 0173 Environmental Management and Site Management Plans specifications

Environmental assessment and planning: GHD carried out the Flora Survey along proposed sewer rising main route. The finding of the assessment is explained in the Agnes Water Protected Plant Assessment_56713 report.

Project specific environmental requirements: In accordance with the GHD Agnes Water Protected Plant Impact Management Plan_56725 report. (Refer additional documents)

Site access

Working hours
Working hours: Operational hours of plant, including the entry and/or departure of heavy vehicles, is restricted to 7 am to 6 pm Monday to Friday and not permitted on Sundays or Public Holidays. Work outside of these hours is not permitted without approval.

Working area and site facilities

Working areas: Restrict construction working areas and areas for temporary site facilities such as the storing of materials, use of plant and erection of sheds, to areas documented on the drawings. Do not work or occupy areas outside of the designated areas.

Alternative site facilities: If proposing to use existing buildings adjacent to, or in close proximity to, the Works as alternative site facilities, obtain approval.

Security: Take security measures for the safe-keeping of any plant, equipment, tools, materials or other property.

Temporary fencing: Provide and maintain temporary fencing and warning signage during the contract to prevent unauthorised entry into the property.

Existing fencing: Reinstate the existing fencing and remove temporary fencing before the date of practical completion.

Protection of persons and property
Temporary works: Provide and maintain required hoardings, barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic control.

Accessways, services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of the services.

Property: Do not interfere with or damage property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Rectification

Accessways, services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Adjoining property

Notice: At least 10 working days before commencing work, submit to owners and occupants of adjoining property written notice of intention to commence work and an outline description of the type and extent of work.
Revealed encroachments: If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining property, immediately seek instructions.

Records: For properties described in the Adjoining properties to be recorded schedule:
- Inspect the properties with the superintendent and owners and occupants of the properties, before commencement of work.
- Make detailed records of conditions existing within the properties, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions, and photographs, to be endorsed by the owners and occupants, or their representatives, as evidence of conditions existing before commencement of work.

Endorsed copies: Submit one endorsed copy of each record. Keep the other endorsed copy on site.
- Purpose of submission: Information only.

Site investigation
Geotechnical and environmental reports: For information only. The geotechnical information, including information on contaminants, provides information on the nature of the ground at each tested part and is not a complete description of conditions existing at or below ground level.
Contractor's responsibility: Examine and assess the following:
- Geotechnical information and the site to determine the impact on the construction of the Works.
- The in situ moisture content likely at the actual time the work is carried out.

3.2 EXISTING UTILITY SERVICES

Existing services
Subsurface utilities: Information shown on the drawings relating to underground or submerged utilities is accurate to the following quality level, to AS 5488:

Location: Before starting earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.
Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.
Services verification: Contact the persons listed in the Utility authority contacts schedule to verify the location of utility services.
Discrepancies: If there is any conflict between the actual location or elevation of any service and the location or elevation of any service shown on the drawings, give notice.
Excavation adjacent to utility services: Use only utility authority approved methods of excavation.
Limitations to work methods: Include in work method procedures, any restrictions required by the relevant authority, such as vibrations in the vicinity of underground and overhead facilities.

Protection of services
Precautions: Secure and protect existing gas, water, drainage pipes, sewers, electric conduits and other existing services both underground and overhead.
Repair to existing: Repair any damage caused to existing gas, water, drainage pipes, sewers, electric conduit and other existing services to the approval of the relevant authority.

Relocation and alterations to existing utility services
Alterations: Give notice and obtain approval, if removal, diversion or cutting into existing utility services is required.
Liaison with utility authority: Include the following:
- Allowance in the program for coordination.
- Allowances in the program for installation by utility authority contractor during the Works.
- Allowance for adjustments to site plant and equipment.
- Allow utility authority contractor to work on or near the site and do not interfere with the operations.
- Reinstatement and backfilling of service trenches to the requirements of the utility authority.
Restrictions: Obtain approval before proceeding with the following:
- Stop work due to utility authority operations.
Relocation of utility services due to equipment or methods of operation. Relocations of services by the contractor: Arrange all relocations or alterations to the Relocation/alteration to services (by contractor) schedule.

Relocations of services by the principal: Relocations and expected program to Relocation/alteration to services (by principal) schedule. Do not commence the Works before completion of the relocation/alteration of the services.

Maintenance responsibility: The contractor is not responsible for the maintenance of any facilities or structures installed or constructed by the utility authorities.

Programming and duration of utility alterations and relocations:
- Give notice of the expected date of completion of each part of the Works required to be completed before the utility services listed in this worksection can be relocated.
- Do not proceed with final trimming or subsequent parts of the work until work on the utility services within that area is complete.
- Delays due to work by authorities: If required, allow utility authorities to remove, relocate, or work on their facilities before continuing the Works.

Extension of time: The Contractor is entitled to extensions of time if the utilities have not been relocated by these dates and this causes delay to the Contract.

3.3 CONSTRUCTION PLANT

Temporary services
Sewer: Make a temporary connection to an existing sewer where one is available. Cap temporary sewer connection at completion.
Water supply: Provide temporary water supply for site facilities. Remove on completion.
Electricity supply: Provide any temporary electricity supply required for site facilities. Remove on completion.

Temporary fencing
Requirement: Provide temporary fencing to site facilities as documented, to the 1196 Boundary fencing for road reserves worksection and as follows:
- Type: 1.83 m high galvanized chain fabric mesh fence.
- Gate: Galvanized tubular steel vehicular access gate.
- Covering to fencing: Full height hessian or shadecloth screen.
Removal: Remove temporary fencing at practical completion.

Advertising signs
Requirement: No advertising is permitted on the site except for the following:
- Approved project signs.
- Manufacturer’s name or names of owner on items of construction plant.
- Contractor’s mail box.

Project work signs
Requirement: Provide project-specific work signs and as follows:
- Locate where directed.
- Maintain in good condition for duration of the work.
- Obtain permission for removal.
- Remove on completion.

Timing:
- Installation: No later than one week from receiving the notice of possession of site.

3.4 BUILDING THE WORKS

Program of work
Construction program: Show the following:
- Sequence of work.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Allowance for relocation of utility services alterations and relocation.
- Activity inter-relationships.
- External dependencies including provision of access, document approvals and work by others.
- Periods within which various stages or parts of the work are to be executed.
- Contractor's float
- Anticipated monthly cash-flow for claims.

Time scale: Working days.

Updated program: Identify changes since the previous issue, and show the estimated percentage of completion for each item of work.

Program chart: Display in the contractor's site office an up-to-date bar chart and network diagram based on the construction program.

**Site meetings**

General: Attend site meetings throughout the contract and arrange attendance of appropriate subcontractors.

Meeting agenda: Include performance measures, coordination of program and work under the contract and resolution of any questions regarding the intent or interpretation of the documents.

Minutes: Site meetings will be chaired and minuted by the superintendent. Copies of the minutes will be issued to all present at the meeting and others concerned with the matters discussed.

**Work by others**

Requirement: Coordinate the Works with simultaneous and/or adjacent work by others and liaise with other contractors and authorities to avoid disruption, delays and possible conflict.

Access: If required, allow free access for completion of any work by others.

**Alternative construction**

Requirement: If the use of alternative materials, design or methods of construction is permitted, prepare detailed working drawings, design calculations and specifications for the alternative.

Documentation: Provide 2 sets of CAD working drawings and any supporting calculations.

Revisions: Attend to any required revisions to drawings or calculations and resubmit 2 sets of the revised drawings and calculations.

Certification: Provide certification by a Professional Engineer experienced in the alternative construction design, verifying conformance of the design.

Submission timing: At least four weeks before construction of the relevant part of the work is scheduled to commence.

Approval to proceed: Do not commence the Works until an endorsed set of working drawings has been returned.

### 3.5 SURVEY CONTROL

**General**

Road construction survey: To ICSM QA Specification G71.

Permanent and cadastral survey marks: Provide verification by a registered surveyor that a search has been carried out before starting the Works and all permanent and cadastral survey marks have been identified and recovered, if required.

**Supplied survey setting out information**

Certification: Before starting the Works, check the digital design model provided for discrepancies between the model and the drawings.

Provision of marks: The superintendent will provide permanent marks shown on the drawings and establish bench marks related to the level datum.
Transfer of marks: Transfer permanent survey marks clear of the operations before any of the survey marks on base lines or various control lines are affected by the Works.

Relocation of survey control: Obtain approval for the relocation of survey control, establishment of recovery pegs, or setting out or levelling.

Protection: Protect all supplied survey marks. If survey marks are damaged or destroyed, re-establishing the survey marks.

Set out pegs
Recovery pegs: Provide and fix adequate recovery pegs in suitable locations adjacent to the elements of work.

Removal: Remove all pegs and profiles at practical completion.

Survey equipment
Requirement: Use electronic total stations and ancillary equipment for survey tasks in conformance with the following:
- Electromagnetic distance measuring device (EDM): Standard deviation for error < 5 mm + 5 ppm.
- Horizontal and vertical circles: Angular measurement standard deviation for error < 3 seconds of arc.
- One second of arc minimum count.
- Diometrical vertical circle reading and automatic tilt compensator.
- Capability to electronically record and store field data such as horizontal and vertical angles, distances, point notation, target and instrument heights.
- The calibration procedure and calibrated at all times.
- Calibrated immediately after any repairs.

Laser and global positioning construction control systems
Horizontal and longitudinal alignment control requirements:
- Offset pegs 500 mm from the surface design edge of subgrade.
- Clearly mark chainages on the pegs.
- Spacing between pegs:
  . < 50 m on the straights.
  . < 20 m on curves including all curve tangent points.
- Place pegs vertically.
- Tolerance: ± 25 mm to the exact horizontal location.
- Protect from disturbance.

Removal: Remove all pegs at practical completion.

3.6 SAMPLES
General
Incorporation of samples: Only incorporate samples in the Works which have been endorsed for inclusion. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until the date of practical completion.

Unincorporated samples: Remove on completion.

3.7 SHOP DRAWINGS
General
Documentation: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and prepare dimensioned set-out drawings.

Record drawings: Amend all documented shop drawings to include changes made during the progress of the work and up to the end of the defects liability period.
3.8 WARRANTIES

General
Requirement: Name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.
Warranty period: Start warranty periods at acceptance of installation.

3.9 WORK-AS-EXECUTED DRAWINGS

Recording, format and submission
Progress recording: Keep one set of drawings, CAD or BIM files on site at all times, expressly for the purpose of marking changes made during the progress of the Works.
Drawing layout: Use the same borders and title block as the contract drawings.
Quantity and format: Conform to SUBMISSIONS.
Endorsement: Certify and date all record drawings.
Accuracy: If errors in, or omissions from, the record drawings are found, amend the drawings and reissue in the quantity and format documented for SUBMISSIONS.
Date for submission:
- Draft submission: 2 weeks before the date for practical completion.
- Final submission: Before issue of final certificate.

Roadworks: Certify all changes to the contract drawings and actual values of all levels, endorsed by a registered surveyor.

Public utilities
Public utilities: Record as required by the worksections.
Surface utilities: Record information on background or submerged utilities to the documented quality level, conforming to AS 5488.

3.10 OPERATION AND MAINTENANCE MANUALS

General
Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.
Referenced documents: If referenced documents or worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Contents
Requirement: Include the following:
- Table of contents: For each volume. Title to match cover.
- Directory: Names and contact details of principal consultant, subconsultants, contractor, subcontractors and name of main contact.
- Work-as-executed drawings: Complete set of record drawings, full size.
- Drawings and technical data: As necessary for the efficient operation and maintenance of the Works.
- Project description: General description of the Works.
- Product descriptions:
  - Name and contact details of the manufacturer and supplier of products installed.
  - Schedules of products, stating locations, and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules for each product installed.
  - Manufacturers’ technical literature for products installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products used in the Works.
- Certificates:
  - Certificates from authorities.
Copies of manufacturers’ warranties.
- Product certification.
- Test certificates for each service installation and all equipment.
- Test reports.
- Commissioning reports.

- Operation procedures.
- Maintenance procedures:
  - Detailed recommendations for periodic maintenance and procedures, including schedule of maintenance work including frequency and recommended tests.
  - Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
  - Safety data sheets (SDS).

**Format – electronic copies**

Printing: Except for drawings required in the **WORK-AS-EXECUTED DRAWINGS** clause, provide material that can be legibly printed on A4 size paper.

Scope: Provide the same material as documented for hardcopy in electronic format.

Quantity and format: Conform to **SUBMISSIONS – electronic copies**.

**Format – hard copy**

General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title **OPERATION AND MAINTENANCE MANUAL**, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers’ printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

**Date for submission**

Draft submission: 2 weeks before the date for practical completion.

Final submission: Before issue of final certificate.

**3.11 TESTS**

**Attendance**

General: Provide attendance on tests.

**Testing authorities**

General: Except for site tests, have tests carried out by a Registered testing authority.

Test instruments: Use instruments calibrated by a Registered testing authority.

**Test reports**

General: Indicate observations and results of tests and conformance or non-conformance with requirements.

**Notice**

Inspection: Give sufficient notice for inspection to be made of the testing as documented.

**Controls**

General: Calibrate, set and adjust control instruments, control systems and safety controls.

**Certification**

General: On satisfactory completion of the installation and before the date of practical completion, certify that each installation is operating correctly.
3.12 COMPLETION

Reinstatement
General: Before the date for practical completion, clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

Adjoining property
Evaluation: At practical completion, for properties described in the Adjoining properties to be recorded schedule inspect the properties with the superintendent and owners and occupants of the properties, recording any damage that has occurred since the pre-commencement inspection.

4 MEASUREMENT AND PAYMENT

4.1 PAYMENTS

General
Payments items for the Works: To the 0152 Schedule of rates (Construction) worksection.

4.2 MEASUREMENT

Methodology
Method of measurement for civil engineering work: To AS 1181.

Non-conforming work: For non-conforming work apply the nominated deductions to the rates given pay items for that work in the 0152 Schedule of rates (Construction) worksection.

5 ANNEXURE

5.1 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execution details</td>
<td>H</td>
<td>Positioning of all units and services for site facilities</td>
<td>1 week before installation</td>
<td>Installation of site facilities</td>
</tr>
<tr>
<td>Working area and site facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBMISSIONS</td>
<td>H</td>
<td>Alternative site facilities in existing buildings</td>
<td>2 weeks before installation</td>
<td>Installation of site facilities</td>
</tr>
<tr>
<td>Execution details</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working area and site facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Discrepancies from documented location</td>
<td>1 week</td>
<td>-</td>
</tr>
<tr>
<td>Existing utility services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Relocation and alterations to existing utility services</td>
<td>1 week</td>
<td>-</td>
</tr>
<tr>
<td>Relocation and alterations to existing utility services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Transfer of survey marks</td>
<td>2-days</td>
<td>-</td>
</tr>
<tr>
<td>Supplied survey setting out information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point
5.2 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay Items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>0136.1 Site establishment</td>
<td>Lump sum.</td>
<td>All costs associated with site establishment and disestablishment, including all documented facilities, site security, fencing, signage, etc.</td>
</tr>
<tr>
<td>0136.2 Confirmation of existing services</td>
<td>Lump sum.</td>
<td>All costs associated with potholing and verification of existing services and levels as well as obtaining any required permits to undertake works within the vicinity of services in advance of trenching and connection works.</td>
</tr>
<tr>
<td>Traffic management</td>
<td>Lump sum.</td>
<td>To the 1101 Traffic management worksection.</td>
</tr>
</tbody>
</table>

5.3 ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

- **AS 1181** 1982  Method of measurement of civil engineering works and associated building works
- **AS 1348** 2002  Glossary of terms - Roads and traffic engineering
- **AS 5488** 2013  Classification of Subsurface Utility Information (SUI)
- **ICSM QA Specification G71** 2009  Intergovernmental Committee on surveying and mapping - Road construction surveys
- **Safe Work Australia** 2014  Hazardous substances information system
0161 QUALITY MANAGEMENT (CONSTRUCTION)

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide a project quality management system (QMS) as documented.

1.2 CROSS REFERENCES

General
Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0136 General requirements (Construction).
- 0152 Schedule of rates (Construction).

1.3 STANDARDS

General
Standard: To AS/NZS ISO 9001.

1.4 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- CAR: Corrective action request.
- ITP: Inspection and test plan.
- NCR: Non-conformance report.
- NNC: Notice of non-conformance.
- QAR: Quality assurance representative (principal).
- QMR: Quality management representative (contractor).
- QMS: Quality management system.
- WAE: Work-as-executed.

Definitions
For the purpose of this worksection, the definitions given in AS/NZS ISO 9000 and the following apply:
- Certification: A written assertion of facts.
- Corrective action request: A formal advice/instruction to the contractor requesting action to eliminate the cause of a detected nonconformity.
- Disposition: Action taken to resolve non-conformance (Lot specific).
- Hold Point: A mandatory verification position in the contract beyond which work cannot proceed without the designated authorisation.
- Inspection and test plan: The document identifying the required inspections and tests of the works.
- Lot: Any part of the works that has been constructed/manufactured under a continuous operation of uniform conditions and is homogeneous with respect to material and general appearance.
- Non-conformance report: A mandatory (standard format) submission by the contractor that details the non-conforming work and the contractor’s proposed disposition of the non-conformance.
- Notice of non-conformance: Formal instruction to the contractor of product non-conformance to documented requirements. It automatically creates a Hold Point and requires an NCR from the contractor.
- Performance audit: (Process audit, technical procedure audit, methods audit) An evaluation of whether nominated methods and procedures are being adhered to in practice.
- Product: The result of a set of interrelated or interacting activities which transforms inputs into outputs.
- **Product audit (Conformance audit, Service audit):** An assessment of the conformity of the product with the specified technical requirements.
- **Qualified surveyor:** A surveyor who is eligible for membership of the Spatial Sciences Institute as a certified engineering surveyor.
- **Quality assurance representative (QAR):** Appointed by the principal for a specific project and responsible for the auditing, review and surveillance of procedures and documentation required by the contractor’s approved Quality plan.
- **Quality checklists:** Forms completed during the manufacture/construction process verifying key steps, and records required for the Quality register. Checklists apply to each identified lot of work.
- **Quality management representative (QMR):** Also known as Project quality representative, appointed by the contractor for a specific project with the authority and responsibility for the implementation and operation of the Quality plan, so that QMS requirements are not subordinated to design and productivity.
- **Quality register:** The files containing all quality control records including test results, completed checklists, certificates of compliance and consignment dockets for materials procured.
- **Quality management system:** The organisational structure, responsibilities, procedures, processes and resources for implementing quality management.
- **Quality management system requirements:** The administrative activities affecting quality that will be implemented and controlled so that the product or a service meets documented quality requirements.
- **Registered testing authority:**
  - An organisation registered by NATA to test in the relevant field; or
  - An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
  - An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- **Special processes:** Those processes, the results of which cannot be directly examined to establish full conformance. Assurance of satisfactory conformance depends on evidence generated during the process.
- **System audit:** An examination of the documented quality management system represented by the quality manual, quality plan and quality register to evaluate their effectiveness in meeting the requirements of Australian Standards and the contract documents.
- **Validation:** Confirmation, through the provision of objective evidence, that requirements for a specific intended use or application have been fulfilled.
- **Witness point:** A nominated position in the manufacture/construction stages of the contract where the option of attendance may be exercised by the Superintendent, after notification of the requirement.
- **Works:** All labour, plant, equipment and materials required to complete a project in conformance with the contract documents.

## 2 PROJECT QUALITY MANAGEMENT SYSTEM

### 2.1 GENERAL REQUIREMENTS

**Conformance**

Work on-site and off-site: Conform to the QMS described within the Quality plan including products and services for all works under the contract.

Contract documents: The QMS does not pre-empt, preclude or otherwise negate the requirements of any part of the contract documents.

Responsibility: QMS requirements do not relieve the contractor of the responsibility to conform with the contract documents.

**System requirements**

QMS: Plan, develop, implement and maintain a documented QMS conforming to this worksection, and AS/NZS ISO 9001, with the following purpose:

- Proposed work methods consistent with documented requirements.
- Adequate and complete ITPs and checklists.
- Implementation of approved work methods.
- Adherence to Hold and Witness Points.
- Appointment of QMR and QAR.

Format: If the format of the QMS documents differ from the format of AS/NZS ISO 9001, provide a matrix outlining how the documented requirements are addressed by the QMS.

2.2 DOCUMENTATION REQUIREMENTS

General
QMS documentation requirements: Include the following:
- Quality policy and objectives.
- Procedure documents.
- Work instructions.
- Forms.
- Quality plan(s).
- Specification(s).
- Relevant external documents.
- Records.

Changes: Immediately implement changes to the project Quality plan and QMS if the following occurs:
- Specification requirements are not adequately addressed.
- Non-conformity resulting from the Quality plan or QMS.
- Audit initiates changes to the QMS.
- Practices have changed.

Records: Provide copies of any quality records within 14 days of request.

Project Quality plan
Requirement: Plan, develop, implement and maintain a Quality plan to AS/NZS ISO 9001 and AS/NZS ISO 10005. Include the following:
- Progressive documentation of new procedures as the work types become evident.
- Planning and control systems: Description of critical processes and activities, including verification for product control.
- Coordination with the contractor’s corporate Quality manual.
- Project specific quality system: Information and direction for personnel about the specific quality practices, resources, sequence of activities, controls and checks that must be implemented during the works.
- Controlled conditions: Documentation to explain how each work process will be carried out.
- Organisation structure: Details of the specific responsibilities and authorities of the key personnel nominated for the management of the project.
- QMR: Qualifications and technical experience, together with responsibilities and authorities to resolve quality matters.
- Details of the personnel or contracted testing organisations who will be conducting each type of conformance inspection and testing of completed works, their experience, qualification and responsibilities.
- Details of the person authorised to change construction processes on site.
- ITPs and checklists to verify the works conform with the contract documents.
- Purchasing quality requirements:
  - Critical characteristics of purchased products that affect the quality of the final product.
  - Method of communication with suppliers.
  - Methods used to evaluate, select and control suppliers.
  - The facilities and services that will be outsourced.
  - Material samples: The approved sample is the quality benchmark.
- Purchasing quality verification.
- Procedure for corrective action to AS/NZS ISO 9001 clause 8.5.2.
- Registered testing authority: Terms of registration and current signatories for the organisation providing testing and test reports.
- End-of contract review procedures.

Control of documents

Requirement: To AS/NZS ISO 9001 clauses 4.2.3 and 4.2.4, and AS/NZS ISO 10005 clauses 5.6 and 5.7.

Register: Maintain a register of each part of the Quality plan. Register the number, date and recipient(s). Reissue to all registered recipient(s) when the Quality plan is changed, superseded or recalled, as required.

Requirement: Document in the Quality plan the method of keeping quality registers, tracking and handling of NCR’s, NNC’s and site correspondence.

Quality register: Implement and maintain systematic records, indexed and filed so that the records are retrievable and accessible to the Superintendent or an appointed quality auditor within one working day of request.

Register of method statements: Provide a register listing all method statements (both standard and job specific) including the title, identifier and revision status.

Location: State in the quality plan where records are to be located.

WAE: Keep records of any amendments to design details for inclusion in WAE drawings.

Quality audit schedule: Include a quality audit schedule with the project quality plan in conformance with AS/NZS ISO 19011.

Audit reports: Provide copies to the Superintendent as requested.

2.3 RESOURCE MANAGEMENT

General

Requirement: To AS/NZS ISO 9001 section 6 and AS/NZS ISO 10005 section 5.8.

Provision of resources: Determine and provide resources for the successful implementation of the project Quality plan.

Limited availability: If a resource has limited availability, identify how demand from other projects/contracts will be satisfied.

Human resources: Provide personnel with the appropriate education, training, skills and experience for the project.

Infrastructure: Identify, provide and maintain the infrastructure required to achieve product conformity.

Work environment: Establish and manage the work environment to achieve product conformity.

2.4 PRODUCT REALISATION

Planning and design

Planning: To AS/NZS ISO 9001 clause 7.3 and AS/NZS ISO 10005 clause 5.11. Include the following:
- Quality objectives and requirements for the product.
- Processes and documents specific to the product.
- Required verification, validation, monitoring, measurement, inspection, test activities and the criteria for acceptance of the product.
- Records required as evidence that the realisation processes and resulting products conform.

Design: Verify the following, for conformance with the documented requirements and AS/NZS ISO 9001:
- Temporary structures.
- Checking of permanent structures for construction loadings.
- Lifting devices for manufactured items.
- Alternative permanent structures or structural components proposed.
- Concrete mixes for structures and pavements and asphalt mixes for permanent works.
- Traffic control, temporary roadways and detours.
- Permanent works where design is nominated in the contract.

2.5 CONSTRUCTION AND SERVICE PROVISION

Control
Method statements: Detail the construction processes for all activities scheduled in **Construction activities schedule**.

Content: Include the following:
- Sequence of operations.
- Documented procedures and work instructions.
- Types of equipment required, capability, maintenance and calibration.
- Any special working environment requirements.
- Personnel competency and skills required.
- Criteria for workmanship and tolerances.
- Materials required.
- Safety requirements.
- Reference documents.
- Records produced.
- Planning.
- Verification measures.
- Inspection, test and control points.
- Monitoring of continuous suitability.
- Responsibility for implementing and monitoring work process controls and rectifying any deficiencies.

Checklist: Provide a checklist, including the relevant inspection and test points, surveying control points, Hold Points, Witness Points and the officer responsible to verify each check point.

System audit: Audit each Method statement during operation of the process.

Absence of a Method statement: If a Method statement for a particular activity is required and none is submitted, this is a Hold Point.

Lot identification
Lots: Divide all items of work into lots as follows:
- Limits: Before sampling, choose lots within the limits given in the relevant worksection.
- Lot size: Not exceeding one day’s output for each work process being tested.
- Lot numbering: Allocate unique lot numbers compatible with the construction program. Use lot numbers as identifiers on all QMS data.
- Field identification: Physically identify each lot and clearly identify lot boundaries. Maintain identification until the lot has achieved the specified quality.

Work on a lot: Do not start work before the field identification is established.

Lot boundaries: When boundaries of a lot change, update the quality register.

Lot identification system: Make sure all site records and sample numbering systems allow easy identification of all test results and the materials incorporated in the works.

Traceability
General: Provide and maintain records of components for audit. Traceability is required as follows:
- Concrete: Start the trace at the batch plant and finish at the location where the concrete is incorporated in the works.
- Stabilised material: Start the trace at the batch plant and finish at the location where the material is incorporated in the works.

Batch details: Record all batch quantities, mix and dispatch time, testing details and location of placement.

Control of monitoring and measuring equipment
Equipment accuracy: Maintain inspection, testing and measuring equipment able to produce the degree of accuracy required by the referenced test methods.
Records: Demonstrate accuracy with regular records of calibration.

2.6 MONITORING, MEASUREMENT AND ANALYSIS

General
Requirement: Demonstrate conformance of the works by systematic inspection and tests.
Testing and sampling: Conduct testing by a registered testing authority accredited for the documented test methods and sampling procedures. Include the latest NATA advice of the terms of registration and current signatories within the quality plan.
Sampling personnel: From the registered testing authority and supervised by the approved signatory.
Sampling locations: Propose sampling locations for approval before proceeding.
Lots: All conformance inspections and tests are based on lots. In all cases the samples are considered representative of the lot and test results are required to meet the appropriate lot tolerances.
Test results: Provide a registered testing authority report on test results, including certification that correct sampling procedures have been followed.
In-process and conformance inspections: Review the results for each lot to confirm that all tests have been carried out to verify conformance.
Verification: Certification by the QMR.
Reinstatement: Reinstate all core holes, test holes, excavations and any other disturbance resulting from any testing activity to the standard in the relevant worksection.

Frequency of testing
Minimum frequency of testing: Not less than that stated in the relevant worksection.
Request for reduced frequency of testing: Submit a proposal with supporting statistical analysis, verifying consistent conformance to the quality requirements.

Random sampling
Requirement: Use random sampling techniques for each lot for the control of compaction of continuous layer of earthworks, selected subgrade zone, flexible pavement layers and asphalt layers.
Test locations: Determine test locations for random sampling in conformance with AS 1289.1.4.1.
Location restrictions: Do not restrict sampling to locations dimensioned or otherwise defined for setting out the works in the drawings or specification.

Inspection and test plans
ITP: Establish and progressively maintain a system to demonstrate inspection and testing in conformance with AS/NZS ISO 9001 clause 8.2.4 and AS/NZS ISO 10005 clause 5.18.
Minimum information for ITP (or ITP forms): Include the following:
- Person responsible for carrying out in-progress and final inspections or testing.
- Proposed inspection or test methods and recording of results.
- Acceptance criteria and frequency of inspection and testing.
- Specification tolerances.
- Person responsible for reviewing inspection and test results, evaluating whether work conforms, determining future action when work does not conform and closing out work lots.
- Measures to control non-conformity.
- When statistical analysis of test results is required.
- Person responsible for performing the final review of results to confirm that all inspections and tests have been carried out to verify complete conformity for each lot.
- Time limits for testing, submission, Hold Points and Witness Points that are nominated in the specifications.
- Identification of Hold Points or Witness Points.
- Checklist for each lot.

Test register
Lot identification register: Include the following information:
- Three dimensional surveyed location of each lot, including the chainage of the start and finish points, lateral location and layer location and/or the particular structure (e.g. pier or abutment number, concrete placement number).
- Indication of conformance or non-conformance.
- Summary of test results.
- Location of test sites including test identification numbers.
- For non-conforming lots, allocate a new number to the resubmitted/subdivided lot(s), with reference to the original lot number.

Inspection and test status: Show either on the ITP records or physically mark in the field the conformance status for each lot.

**Hold points**
Notice of inspection: Give notice in advance of a Hold Point being reached.

Requirements for approval to proceed: Provide the following:
- Information required by the specification or relevant worksection.
- Certification that the particular lot/process is conforming.
- Certification that all underlying and adjacent lots affected by the lot in question are conforming.
- The appropriate form (checklist, NCR or NNC) at least 24 hours before the proposed placement/construction of the next lot.

Witness point: If the Hold Point has resulted from an NCR or NNC, approval may be conditional on a Witness Point being included.

### 2.7 SURVEY CONTROL

**Requirements**
Survey control: Establish and maintain a system, for measurement, calculation and recording procedures appropriate to the following:
- Set-out of the works.
- Verification of conformance with the drawings and specification in relation to dimensions, tolerances and three dimensional position.

Determination of lengths, areas or volumes of materials or products, where required for measurement of work.

Method statement: Describe the control parameters for special processes which cannot be fully verified by inspection and testing. Address all potential errors that may be introduced by survey methods.

Surveyor qualifications: Appoint qualified surveyors to supervise and take responsibility for all surveying control.

Equipment and procedures: Capable of attaining the documented tolerances.

Survey locations: Surveying for conformance verification is not restricted to the locations used to set out the works.

Conformance verification surveys: Perform verification surveys not later than one working day after the lot or component has become accessible for survey.

**Control of documents**
Survey conformance report: Submit a survey conformance report for each lot or component where design levels, position and/or tolerances have been specified. Reference the relevant field book page numbers.

Information required: Indicate the difference between actual and documented values for position and level (defined by co-ordinates or chainage and offset) and provide certification by the qualified surveyor responsible for the verification survey.

Survey records: Provide all survey records including equipment calibration records and non-conformity registers.

Field book pages: Include the following, clear labels, date and signature by the surveyor, cross indexed references to equipment used and lot/component identification.

Recorded data: Retain any automatically recorded data used for verification surveys, including a printout of both raw (field) data and reduced data.

Audit trail: Prepare procedures to describe the records system, including the method of storing and indexing of electronic records and the computer software used for the reduction of survey measurements and calculations.
2.8 CONTROL OF NON-CONFORMING WORKS

General
Detection and reporting: Report any works that depart from the documented requirements on a NCR form within two working days of detection, including the proposed disposition.

Proposed disposition: Include any of the following:
- Proposed additional works to bring the lot up to the documented standard.
- Proposed replacement of all or part of the lot to bring it up to the documented standard.
- A request to use the lot for a reduced level of service, if allowed by the documented requirements.
- For incidental defects, a request that the Superintendent accept the lot without alteration, as an exception with or without alteration to the respective unit rates.

Monitoring and measuring
NCR: A Hold Point until non-conformance is rectified and Hold point is released.
Progress: Do not cover up non-conforming works until a disposition has been accepted/approved and implemented.

Reworking: If the non-conformance can be rectified by reworking the lot with the original process, an NCR is not required. Maintain a record of the non-conformance to aid continual improvement.
Conformance: Verify that reworked/replaced lots conform to the documented requirements.
Discrepancy: If there is any discrepancy in test results, the Superintendent’s test results will prevail.

Control of documents
CAR: Review and improve the QMS to eliminate the cause of identified non-conformance.
NCR: Submit an NCR based on the proforma in the ANNEXURE including the following:
- Details of non-conformance.
- Proposed disposition.
- Provision for attachments.
- QAR comment/approval/rejection.
- Completion of disposition.
- Release of Hold Point.
- Corrective action to improve quality.
- Close-out of NCR.

Authorised representative: Sign off all actions by authorised representatives of the contractor and superintendent as appropriate.
Register: Implement and maintain a numbering and registration system for all NCRs and NNCs, including cross referencing as required.

Corrective action
Requirement: Review and improve the Quality plan to eliminate the causes of the non-conformance to prevent recurrence.
Proposed corrective action: Indicate the corrective action appropriate on the NCR form.

2.9 COMPLETION

Finalisation
Quality register: Submit a copy within one month of the date of practical completion. If requested, also provide a copy of all quality records.
Defects liability period: Resolve and close-out all quality non-conformance before the end of the defects liability period.

Review
Requirement: Organise meeting(s) to review the quality system and technical issues met on the project, and identify the lessons to be learned for future projects, including the following:
- Identification of non-conformances and the implementation of corrective action.
- Issues arising from inspections and audits.
- Contract documentation issues.
- Design and technical issues.
- Safety issues.
Timing: Hold meeting(s) before the date for practical completion so that key personnel are still available to participate in review process.

3 ANNEXURES

3.1 ANNEXURE – PROJECT QMS DOCUMENTATION FLOW CHART

3.2 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>0161.1 Quality system documents and records</td>
<td>Lump Sum</td>
<td>All costs associated with the preparation and submission of the Quality plan, the provision of the QMR on site and the maintenance of the quality records during the course of the contract.</td>
</tr>
<tr>
<td>0161.2 Quality verification and control</td>
<td>Lump Sum</td>
<td>All costs for inspections, conformance surveys and testing required to verify that all aspects</td>
</tr>
</tbody>
</table>
of the works conform to the quality assurance provisions of the contract (includes supply of potable water or effluent from the WWTP for testing and flushing back to WWTP), i.e. pressure testing, compaction testing and other required tests under the contract.

3.3 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

<table>
<thead>
<tr>
<th>Document Code</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 1289</td>
<td></td>
<td>Methods of testing soils for engineering purposes</td>
</tr>
<tr>
<td>AS 1289.1.4.1</td>
<td>1998</td>
<td>Sampling and preparation of soils - Selection of sampling or test sites - Random number method</td>
</tr>
<tr>
<td>AS/NZS ISO 9000</td>
<td>2006</td>
<td>Quality management systems - Fundamentals and vocabulary</td>
</tr>
<tr>
<td>AS/NZS ISO 9001</td>
<td>2008</td>
<td>Quality management systems - Requirements</td>
</tr>
<tr>
<td>AS/NZS ISO 10005</td>
<td>2006</td>
<td>Quality management systems - Guidelines for quality plans</td>
</tr>
<tr>
<td>AS/NZS ISO 19011</td>
<td>2014</td>
<td>Guidelines for auditing management systems</td>
</tr>
</tbody>
</table>
0173 ENVIRONMENTAL MANAGEMENT (AUS-SPEC)

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide environmental management system, as documented.

1.2 CROSS REFERENCES

General
Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0136 General requirements (Construction).
- 1102 Control of erosion and sedimentation (Construction).

1.3 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- EIA: Environmental impact assessment.
- EMP: Environmental management plan.

Definitions
General: For the purposes of this worksection the following definitions apply:
- Authorities: Any authority or agency covering statutory requirements relating to the project, including clearances for work in that particular area.
- Clearances: A formal certificate, approval or condition issued by an authority to allow work to be carried out in a particular area.
- Contamination of land: The presence of a substance in, on or under the land which is a designated hazardous material and/or is at a concentration above that which is normally found in that locality, presenting a risk of harm to human health or to the environment.
- Environment: The physical factors of the surroundings of human beings including the land, waters, atmosphere, climate, sound, odours, tastes, the biological factors of animals and plants and the social factor of aesthetics.
- Environmental audits: A review of environment management practices, in particular the evaluation of a site for environmental liability.
- Environmental impact assessment: A method for predicting environmental impacts of a proposed development including minimising identified impacts.
- Environmental management plan: A project or site specific plan describing the management of the environmental issues and considerations for the activity being undertaken. This applies to the design, construction and/or operation of the civil works and infrastructure.
- Organic waste: Includes all food wastes, vegetative wastes from land clearing and pruning operations, biosolids produced from the treatment of liquid wastes, garden and forestry waste (bark and saw dust), and paper and cardboard waste products.
- Pollution incident: An incident or set of circumstances during or as a consequence of which there is, or is likely to be, a leak, spill or other escape of a substance as a result of which pollution has occurred, is occurring or is likely to occur.
- Weed: An invasive plant that degrades natural areas, reduces the sustainability or affects the health of people and animals.

1.4 SUBMISSIONS

Plan
Requirement: Submit the following:
- Environmental management plan.
- Soil erosion and sediment control plan.
- Waste management plan.
- Ground contamination control plan.

1.5 INSPECTIONS

Notice
Inspection: Give notice so that inspection may be made of the following:
- Unexpected finds: Discovery of unexpected finds.
- Non-conformance:
  . Discovery of non-conforming items.
  . Completed removal or rectification of non-conforming items.

2 EXECUTION

2.1 ENVIRONMENTAL MANAGEMENT PLAN

Plan
EMP: Prepare a plan with the following details:
- Project description, including site location, construction activities, and project schedule.
- EMP context, describing how the EMP fits into the overall project planning process.
- EMP objective and environmental policy.
- Assignment of responsibility for environmental controls, including hierarchy of management.
- Conditions of approvals, licences and permits to meet statutory requirements.
- Reporting requirements.
- Environmental training plan and procedures. Include in the plan, a program to familiarise staff with the EMP and/or management controls, environmentally sensitive areas and responsibilities.
- Environmental auditing program and corrective action procedures.
- Emergency response procedures including response time.
- Risk assessment.
- Details of potential environmental impacts and operational control measures for implementation including:
  . Heritage.
  . Preservation of visual values.
  . Protection of endangered species
  . Preservation of habitat

- Clearing permit: Contractor is required to lodge a clearing permit for the removal of remnant vegetation.

- Details of environmental protection for each activity.
- Locations of environmental controls and environmentally sensitive areas.
- Communication procedures.
- Other items necessary to protect the surrounding environment.

Activities staging: Address the phases of activity, as appropriate:
- Site establishment.
- During construction.
- After construction, including rehabilitation activities and site and landscaping maintenance such as erosion and sedimentation controls.

Preliminary EMP: Submit with the tender documentation.
Completed EMP: Submit before work commences on site.
2.2 PROCEDURES AND PERSONNEL

Legislative environmental control requirements

Community liaison
General: Notify residents of construction activities which will affect access to, or disrupt the use of, their properties.
Notice: Minimum 5 working days, unless the work is of an urgent nature with safety implications.
Notification content:
- The nature of the work.
- The reason for it being undertaken.
- The expected duration.
- Changes to traffic arrangements and property access.
- The 24-hour contact number of the representative responsible.

Internal monitoring
Documentation: Provide descriptions of the following:
- Environmental monitoring: Procedures for implementation and recording.
- For all control measures to be implemented: Non-conformance control and corrective action procedures.
Records: Maintain records of results of environmental monitoring, including the effectiveness of any remedial action taken.
Internal monitoring personnel: Provide staff names and contact details.
Machinery and equipment: Provide details of proposed plant.
Review timing: Undertake reviews of the EMP and control measures at the following stages:
- When there is a change in the project, e.g. scope.
- Following significant environmental accidents, including pollution incidents.
- When improved performance is required to reduce specific environmental impact.
- At completion of environmental audits.
- At the end of the project.

Emergency response
Emergency response personnel: Provide staff names and contact details.

Complaints
Reporting: Within 1 working day of receiving a complaint about any environmental issue, including pollution, submit a written report detailing the complaint and remedial action taken.
Register: Keep a register of all environmental complaints and action taken.

Reporting
Requirement: Compile the environmental management reports to record the progress of the following:
- Performance against statutory requirements.
- Performance against the EMP, environmental objective and policy, ecologically sustainable development outcomes and targets.
- Summary of monitoring, inspection and audits.
- Summary of reports required to meet the statutory requirements.
- Summary of environmental emergencies, incidents, non-conformance and complaints.
- Summary of corrective actions where required.

Unexpected finds
Requirement: If encountered, give notice and close off affected site area with barrier tapes and warning signs to prevent access. Unexpected finds include asbestos and other hazardous or volatile contaminants, archaeological finds and items of heritage value.
2.3 MONITORING

Checking
Monitoring and measurement: Monitor and measure on a regular basis the operations that may have a significant environmental impact. Conform to AS/NZS 4581 Component 8.
Conformance: Maintain procedures for periodically evaluating conformance with legal requirements.
Non-conformity, corrective and preventive action: Maintain procedures for dealing with actual and potential non-conformities by taking corrective and preventive action. Implement and record any changes in the documented procedures resulting from corrective and preventive action.
Control of records: Maintain procedures for identification, storage, protection, retrieval, retention and disposal of records.
Internal audit: Maintain procedures for periodic EMS audits and as follows:
- Determine if the EMS conforms to the planned EMS, including the requirements of AS/NZS ISO 14001, and has been properly implemented and maintained.
- Provide information on the results of audits to the superintendent.

2.4 CONTROL OF NON-CONFORMING WORKS

Non-conformance
Detection and reporting: Report any works that depart from the documented requirements.
Progress: Do not cover up non-conforming works until corrective action has been accepted/approved and implemented.
Conformance: Verify that reworked/replaced works conform to the documented requirements.

2.5 EROSION AND SEDIMENTATION

Control plan
Requirement: To the 1102 Control of erosion and sedimentation (Construction) worksection.

2.6 WASTE MANAGEMENT

Control plan
Plan: Prepare a waste management plan and identify major waste streams that will be generated during the contract, including the following:
- Organic waste.
- Construction waste, including:
  - Spoil.
  - Demolition waste.
  - Asphalt or bitumen.
  - Concrete
  - Metal.
- For each waste stream indicate:
  - How and where the waste will be re-used, recycled, stockpiled or disposed of.
  - How the waste will be transported between the site and point of re-use, recycling, stockpiling, treating or disposal and who will be responsible.
Waste stream: Submit details of location, labelling and protection of stock piles for the identified waste stream.

Disposal of materials
Spoil: Remove cleared and grubbed material from the site and dispose of legally.
Mulch
Seed free aerial vegetative matter: Using a chipper, reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for re-use as mulch.
Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow and noxious weeds.
Mulching cleared vegetation: Submit details of provisions.
2.7 GROUND CONTAMINATION

Control plan
Requirement: Prepare a ground contamination control plan if land is suspected of being contaminated or the presence of acid sulphate soil is found, in conformance with the Environmental Protection Authority (EPA) and planning guidelines for each state and with the following details:
- Preliminary investigation.
- Detailed investigation.
- Site Remedial Action Plan (RAP).
- Site auditing and reporting procedures.
- Record maintenance procedures, e.g. record of remediation work, certificates issued and restrictions placed on the site.

2.8 WEED MANAGEMENT

Control plan
Plan: Prepare a weed management plan with the following details:
- Identify weeds and infestation zones within the work site and the investigation period.
- Method and date of cleaning vehicles and machinery.
- Cleaning bay location and treatment date.
- Contaminated fill stockpile, treatment type and treatment date.

Weed management personnel
Requirement: Submit details of the following:
- Subcontractors who will treat weed infestations.
- Chemical handlers, qualifications, date, and spray type.

2.9 SITE CONTROL AND PROTECTION MEASURES

Air quality control
Requirement: Protect adjoining owners, residents and the public against dust, dirt, water nuisance and injury. Use dust screens and watering to reduce dust nuisance.

Exhaust gases from plant, machinery and vehicles: Make sure there is no health risk or loss of amenity from the emission of exhaust gases to the environment.

Dewatering
Requirement: Keep earthworks free of water. Provide and maintain slopes, crowns and drains for excavations and embankments, to make sure there is free drainage. Construct, including placing of fill, masonry, concrete and services, on ground where free water has been removed. Prevent water flow over freshly laid work.

Water disposal: Dispose off-site.

Lighting of fires
Prohibition: Do not light fires.

Noise control and vibration
Standard: To the recommendations of AS 2436.

Noise levels: Avoid excessive noise and long periods of elevated noise that is reasonably anticipated to annoy or adversely affect the adjacent community.

Noise suppression: Minimise noise nuisance with measures including the following:
- Enclose noisy equipment.
- Provide noise attenuation screens.
- Maintain plant in good working order.
- Fit effective residential class silencers to all engine exhausts.
- Fit engine covers to all plant.

Limits on ground vibration: Make sure ground vibration levels transmitted from operating items of plant in the vicinity of buildings do not exceed levels that are close to the lower level of human perception inside the premises or cause structural damage to the buildings and other structures.
Monitoring: Provide the following:
- Baseline condition measurements before commencement of the works.
- Progressive monitoring during the works to confirm conformance with approval conditions.

Vegetation and fauna
Wildlife to be protected: All native species.
Trees to be removed: Inspect to establish if nesting native fauna are present. If present, give notice.
Pruning: To AS 4373.

Vehicular and equipment contamination precautions
Covers: Use tarpaulins to prevent the dropping of materials on public roads.
Washing: Wash the underside of all vehicles leaving the site as follows:
- Mud: Do not carry onto other areas, including adjacent paved streets.
- Weeds: If those designated by the local authority are present on the site, make sure seeds are not carried onto other areas, including adjacent paved streets.

Wheel wash/shaker bay
Facilities: Provide the following:
- Surface: Crushed concrete or rock of between 100 mm and 200 mm approximate diameter.
- Services: High pressure hose water supply.
- Location: Locate the shaker bay and provide berms to drain to grassed areas of the site and allow infiltration to the subsurface.

2.10 OTHER ENVIRONMENTAL CONTROLS

Cultural heritage
Roles and responsibilities: Train personnel on their responsibilities for cultural heritage and make them aware of any sites/areas which must be avoided. Mark-up the sites/areas on a site map and make available to all relevant personnel during the works.
Notice: Give notice if any item encountered is suspected to be an artefact of heritage value, relic or material which is Aboriginal or belonging to early settlement.
Action: Stop construction work that might affect the item and protect the item from damage or disturbance.

Gladstone Regional Council will bear the cost of the PCCC / Gidarjil monitors to be present on site during construction.

Clearances
Refer to additional documents "Add 6_cultural heritage clearance letter".

Habitat provision
Material: Felled trees and excavated rocks.

3 ANNEXURES

3.1 ANNEXURE - SUMMARY OF HOLD AND WITNESS POINTS

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control plans</td>
<td>H</td>
<td>Approval of EMP</td>
<td>1 Week before site commencement</td>
<td>Site commencement</td>
</tr>
<tr>
<td>Environmental management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS</td>
<td>W</td>
<td>Discovery of unexpected finds</td>
<td>Progressive 3 days</td>
<td>Removal</td>
</tr>
<tr>
<td>Notice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Clause and description

<table>
<thead>
<tr>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery of non-conforming items</td>
<td>Progressive 2 days</td>
<td>Removal</td>
</tr>
<tr>
<td>Completion of removal or rectification</td>
<td>2 days</td>
<td>-</td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point

### 3.2 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>0173.1 Environmental management system documents and records</td>
<td>Lump Sum</td>
<td>All costs associated with the preparation and submission of the environmental management plan and the maintenance of the records during the course of the contract.</td>
</tr>
<tr>
<td>0173.2 Environmental management verification and control</td>
<td>Lump Sum</td>
<td>All costs for inspections, conformance surveys, testing and implementation of control measures. Verify that all aspects of the works conform to the Environmental management provisions of the contract.</td>
</tr>
</tbody>
</table>

### 3.3 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

- **AS 2436** 2010 Guide to noise and vibration control on construction, demolition and maintenance sites
- **AS 4373** 2007 Pruning of amenity trees
- **AS/NZS 4581** 1999 Management system integration - Guidance to business, government and community organization
- **AS/NZS ISO 14001** 2004 Environmental management systems - Requirements with guidance for use
GENERAL

RESPONSIBILITIES

General
Requirement: Provide road reserve landscaping and street trees, as documented.

CROSS REFERENCES

General
Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
0136 General requirements (Construction).
0161 Quality management (Construction).
1101 Traffic management.
1102 Control of erosion and sedimentation (Construction).

STANDARDS

General
Storage and handling of pestcides: To AS 2507.
Tree stock: To AS 2303.

INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:

Definitions
General: For the purposes of this worksection the definitions given in AS 2303 and the following apply:
Ameliorant: Material used to make or improve soil.
Anionic bitumen: A type of bituminous emulsion where dispersed particles comprise a bituminous binder and are negatively charged.
Size Index: Numerical expression of the size or physical bulk of a tree stock above ground.

SUBMISSIONS

Execution details
Ameliorants: If required to include ameliorants, recommend the source of ameliorant material, rates and methods of incorporation.
Plant material: Submit details of proposed fertiliser to be used.
Soil conditioning: If other than gypsum is proposed, submit details.
Transplanting trees: Submit a program for regular fertiliser applications during the plant establishment and maintenance period.

Products and materials
Imported topsoil: Submit evidence verifying the following:
Suitability of each soil type for its documented use.
Similarity to naturally occurring local soil.
Suitability for establishment and on-going viability of the site vegetation.
Absence of any weed propagules or contaminants.
Plant provenance: Submit documentation that all plant material has been grown from locally provenanced stock. If this is not achievable give notice.
Species: Submit written certification that all plant material is true to the required species and type.
Trees: Submit evidence of conformance to AS 2303.
Seed supply: Submit the name(s) of the proposed seed supplier(s).

**Samples**
General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.
Bulk materials: Submit a 5 kg sample, of documented materials with required test results.

**Tests**
Results: Submit results of testing to ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES.

**INSPECTIONS**

**Notice**
General: Give notice so that inspection may be made of the following:
Slopes and drains: Prepared surface for cultivation and conditioning.
Plants on arrival at site.
Landscape planting: Set out of plants, soil conditioner and fertiliser.
Transplanting street trees:
  - Final orientation of the tree.
  - Watering, fertilising and root cutting: In existing location.
  - Watering, fertilising and root cutting: In relocated location.

**MATERIALS**

**GENERAL**

**TOPSOIL**

**General**
Topsoil: To AS 4419 and as follows:
Free of refuse or materials toxic to humans, animals or plants.
Maximum soluble salt content: 0.06% by mass.
Health warning: To AS 4419, on packaging or invoice for bulk supply.

**Management of stockpiles and batters**
Requirement: To Management of stockpiles and batters in 1102 Control of erosion and sedimentation (Construction) worksection.

**PLANT MATERIAL**

**Turf**
Description: 25 mm depth of dense, well rooted, vigorous grass growth with 25 mm depth of topsoil and free of weeds, soil pests and diseases.
Prohibited material: Kikuyu grass.
Supply: As rolls in long lengths of uniform widths, in sound unbroken condition.
Width of rolls: > 300 mm.

**Seed and turf table**

<table>
<thead>
<tr>
<th>Material</th>
<th>Species</th>
<th>Minimum application rate (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turf grass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Areas</td>
<td>Couch</td>
<td>As directed</td>
</tr>
</tbody>
</table>
EXECUTION

GENERAL

OPEN DRAINS

Preparation of the surface
Topsoil: Spread to an average compacted thickness of 50 mm, with a minimum compacted thickness of 30 mm at any location.

Timing: Complete vegetation within 7 days of the completion of open drain excavation.

Surface protection
Turfing: Butt runs of turf hard against each other and place perpendicular to the direction of water flow in the drain. Pin into position at 500 mm centres. Topdress seams of turf with topsoil.

ANNEXURES

ANNEXURE - PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule Rate inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0257.1(1) Vegetation - Hydro Mulching</td>
<td>m²</td>
<td>All costs associated with the vegetation of such slopes by hydro mulching other than the cost of watering.</td>
</tr>
<tr>
<td>0257.1(2) Vegetation - Turfing</td>
<td>m²</td>
<td>All costs associated with the vegetation of such slopes by turfing other than the cost of watering, and supply of imported topsoil.</td>
</tr>
<tr>
<td>0257.1(3) Watering</td>
<td>Lump sum</td>
<td>All costs associated with supply and delivery of the water and the watering of the seeded and/or turfed areas.</td>
</tr>
<tr>
<td>0257.2 Supply and placing of imported topsoil</td>
<td>The cubic metre measured loose in the truck as delivered</td>
<td>All costs associated with the supply and delivery of the topsoil to the site. Placing and spreading of the topsoil is in excluded from this pay item and is included in the specific activity pay items for vegetation or planting as appropriate.</td>
</tr>
</tbody>
</table>

Traffic management | Lump sum | To the 1101 Traffic management worksection |

Erosion and sedimentation | | To the 1102 Control of erosion and sedimentation (Construction) worksection |

Earthworks | | To the 1112 Earthworks (Road reserve) worksection |

ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1160 1996 Bitumen emulsions for construction and maintenance of pavements
AS 2303 2015 Tree stock for landscape use
AS 2507 1998 The storage and handling of agricultural and veterinary chemicals
AS 4373 2007 Pruning of amenity trees
AS 4419 2003 Soils for landscaping and garden use
<table>
<thead>
<tr>
<th>Standard</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 4454</td>
<td>2012</td>
<td>Composts, soil conditioners and mulches</td>
</tr>
<tr>
<td>AS 4843</td>
<td>2001</td>
<td>Synthetic weed blocking fabric</td>
</tr>
</tbody>
</table>
0310 CONCRETE – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide cast concrete, as documented.

Design
Formwork: The design of formwork, other than profiled steel sheeting composite formwork, is the contractor’s responsibility. Allow for dimensional changes, deflections and cambers resulting from the following:
- Imposed actions.
- Concrete shrinkage and creep.
- Temperature changes.
- The application of prestressing forces (if any).
Structural design: To AS 3600.

Performance
Requirements:
- Conforming to the design details and performance criteria.
- Satisfying quality and inspection requirements.
- Compatible with documented finishes.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- 0136 General requirements (Construction).

1.3 STANDARDS

General
Formwork design and construction, formed surfaces: To AS 3610 and AS 3610.1.
Plywood formwork: To AS 6669.
Profiled steel sheeting, including shear connectors: To AS 2327.1.
Specification and supply of concrete: To AS 1379.
Reinforced concrete construction: To AS 3600.
Residential ground slabs and footings: To AS 2870.
Post-tensioning: To AS 3600.
Concrete structures for retaining liquids: To AS 3735.
Strand, bar and wire: To AS/NZS 4672.1.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:
- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Anti-burst reinforcement: Reinforcement cage surrounding anchorages to control the tensile bursting stresses.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Batch: A quantity of concrete containing a fixed quantity of ingredients and produced in a discrete operation.
- Concrete class:
  - Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise conforming to AS 1379 clause 1.5.3.
  - Special: Concrete which is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise conforming to AS 1379 clause 1.5.4.
- Early age strength: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Formwork:
  - Jump formwork: Incrementally moved formwork.
  - Lost formwork: Sacrificial formwork left in place.
  - Slip formwork: Continuously slipped or moving formwork.
  - Table forms: Prefabricated and re-usable formwork systems for slabs and beams.
- Green concrete: Concrete which has set but not appreciably hardened.
- Production assessment: An assessment procedure for concrete specified by strength grade, carried out by the supplier on concrete produced by a specific supplying plant and based on the statistical assessment of standard compressive strength tests on concrete.
- Project assessment: An assessment procedure for concrete specified by strength grade, specified at the customer’s option, which provides additional test data for the statistical assessment of concrete supplied to a specific project.
- Sample: A physical example that illustrates workmanship, materials or equipment, and establishes standards by which the work will be judged. It includes samples, prototypes and sample panels.
- Specimen: A portion of a sample which is submitted for testing.
- Weather:
  - Cold: Ambient shade temperature less than 10°C.
  - Hot: Ambient shade temperature greater than 30°C.

1.5 TOLERANCES

Formwork
Plumb of elements > 8 m high: 1:1000.
Plumb of elements ≤ 8 m high: To AS 3610.1.
Position: Construct formwork so that finished concrete conforms to AS 3600 clause 17.5 and as documented in the Formwork dimensional deviation schedule.

Reinforcement
Fabrication and fixing: To AS 3600 clause 17.2.
Reinforcement and tendon position: To AS 3600 clause 17.5.3.

Finishes
Formed surfaces quality of surface finish: To AS 3610.1 Table 3.3.2.
Unformed surfaces flatness: To the Flatness tolerance class table, using a straightedge placed anywhere on the surface in any direction, for the documented class of finish.

**Flatness tolerance class table**

<table>
<thead>
<tr>
<th>Class</th>
<th>Measurement</th>
<th>Maximum deviation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2 m straightedge</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>3 m straightedge</td>
<td>6</td>
</tr>
<tr>
<td>C</td>
<td>600 mm straightedge</td>
<td>6</td>
</tr>
</tbody>
</table>
1.6 SUBMISSIONS

Design
Contractor to confirm in situ bearing pressure at each thrust block locations (Hold Point) and agree with superintendent. For tender purposes 100 kpa bearing pressure has been allowed to size the thrust block.

Execution details
Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:
- Changes to the concrete mix.
- Curing and protection methods.
- Curing period for low-pressure steam curing.
- Cutting or displacing reinforcement, or cutting or coring hardened concrete.
- Handling, placing, compaction and finishing methods and equipment, including pumping.
- Placing under water.
- Sequence and times for concrete placement, and construction joint locations and relocations.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods.
- Sequence of concrete placement: Submit details of any proposed If sequential placement of slab segments.
- Sawn joints: Submit details of proposed methods, timing and sequence of sawing joints.

Reinforcement: Submit the following:
- General: Details of any proposed changes to documented reinforcement.
- Damaged galvanizing: Details of proposed repair to AS/NZS 4680 Section 8.
- Mechanical bar splices Details and test certificates for each size and type of bar to be spliced.
- Provision for concrete placement: Details of spacing or cover to reinforcement that does not conform to AS 3600.
- Splicing: Details of any proposed changes to documented requirements.
- Welding: Details of any proposed welding of reinforcement.

Pre-mixed supply delivery doockets: For each batch, submit a docket listing the information required by AS 1379, and the following:
- For special class performance concrete: Documented performance and type of cement binder.
- For special class prescription concrete: Details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- Project assessment carried out each day.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.
- The total amount of water added at the plant and the maximum amount permitted to be added at the site.

Materials
Product conformity: Submit current assessments of conformity, as appropriate, as follows:
- Certificate of conformity by a JAS-ANZ accredited third party.
- Report by a NATA accredited laboratory describing tests and giving results which demonstrate that the product conforms.

Concrete mixes: Submit details, for each grade and type of concrete including any proposed use of special-purpose cement types.

Curing compounds: Submit details of any proposed liquid membrane forming curing compound, including the following:
- Certified test results for water retention to AS 3799 Appendix B.
Evidence of compatibility with concrete, and with applied finishes including toppings and render, if any, including methods of obtaining the required adhesion.

For visually important surfaces, evidence that an acceptable final surface colour will be obtained.

Admixtures: Submit details of any proposed admixtures, including the following:
- Brand name.
- Place of manufacture.
- Basic chemical composition.

Reinforcement strength and ductility: Submit type-test reports to verify conformance to AS 3600 Table 3.2.1 for each reinforcement type.

Subcontractors
Pre-mixed supply: Submit names and contact details of proposed pre-mixed concrete suppliers and alternative source of supply in the event of breakdown of pre-mixed or site mixed supply.

Tests
Other tests: Submit results, as follows:
- Site slip resistance test of completed installation to AS 4663.
- Concrete compressive strength test results to AS 1012.9.

1.7 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Completed formwork and reinforcement, tendons, cores, fixings and embedded items fixed in place.
- Used formwork, after cleaning and before re-use.
- Concealed surfaces or elements before covering.
- Commencement of concrete placing.
- Stripping single storey suspended work, if conformance with AS 3610.1 is not possible.
- Commencement of initial, incremental or final stressing of tendons.
- Cutting and grouting tendons.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

2 PRODUCTS

2.1 MATERIALS

General
Stockpile: If uniform, consistent colour is documented, stockpile sand, cement and aggregates.

Aggregates
Standard: To AS 2758.1.

Cement
Standard: To AS 3972.
Age: Less than 6 months old.
Storage: Store cement bags under cover and above ground.

Water
Standard: To AS 1379 clause 2.4.
Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/l of chloride ions.

Polymeric film underlay
Vapour barriers and damp-proofing membranes: To AS 2870 clause 5.3.3.
Chemical admixtures
Standard: To AS 1478.1.

Curing compounds
Curing compounds: To AS 3799.

2.2 CONCRETE

Properties
Concrete mix and supply: Conform to the following:
- Normal-class: To AS 1379 clause 1.5.3.
  - Properties: As documented in the Concrete properties schedule - performance.
- Special class: To AS 1379 clause 1.5.4.
  - Properties: As documented in the Concrete properties schedule - performance.

2.3 TESTING

General
Test authority: Concrete supplier or NATA registered laboratory.
Reports and records of test results: To the relevant parts of the AS 1012 series. Keep results on site.

Assessment process of test results
Standard: To AS 1379.
Method of assessment: Project assessment.

Sampling
Method of sampling: AS 1012.1.
Sampling locations: To AS 1012.1 and the following:
- Slump tests: On site, at the point of discharge from the agitator.
- Compressive strength tests: Spread the site sampling evenly throughout the pour.

Frequency of sampling: To AS 1379 Sections 5 and 6 and the following:
- Slump tests: Take at least one sample from each batch.
- Compressive strength tests: To the Project assessment strength grade sampling table.

Project assessment strength grade sampling table

<table>
<thead>
<tr>
<th>Number of batches for each type and grade of concrete per day</th>
<th>Minimum number of samples: Columns and load bearing wall elements/batch</th>
<th>Minimum number of samples: Other elements/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2-5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6-10</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>11-20</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>each additional 10</td>
<td>1</td>
<td>1 additional</td>
</tr>
</tbody>
</table>

Making and curing of specimens
General: To AS 1012.8.1 and AS 1012.8.2.
Specimens for compressive strength tests: Make and cure at least two specimens from the sample of each grade.
Specimen size:
- Aggregate size ≤ 20 mm: Nominally 200 x 100 mm diameter.
- Aggregate size > 20 mm: Nominally 300 x 150 mm diameter.

Test methods
General: To the relevant parts of the AS 1012 series.
Acceptance criteria:
- General: As documented in the Concrete properties schedule – performance.
- Early age compressive strength: As documented in the Control tests schedule.

Slump tests: Assess slump for every batch. Perform slump test on each strength sample.

Drying shrinkage at 56 days: To AS 1012.8.4 and AS 1012.13.

Embedded pressure pipes
General: Complete leak tests before embedding pipes.

2.4 FORMWORK

General
Form linings, facings and release agents: Compatible with finishes applied to concrete.
Lost formwork: Free of timber or chlorides, and not to impair the structural performance of the concrete members.
Void formers: Material capable of maintaining rigidity and shape until the concrete has set, capable of withstanding construction loads and non-collapsible on absorption of moisture.

Plywood formwork
Material: To AS 6669.
Grade: Use appropriate grade for the documented design dimensions, loading and surface quality.
Joints: Seal the joints consistent with the documented surface finish class.
Tolerances: To AS 3610.1 Section 3.

2.5 REINFORCEMENT

Steel reinforcement
Standard: To AS/NZS 4671.
Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Protective coating
Standard: To AS 3600 clause 17.2.1.2.
Requirement: For concrete elements containing protective coated reinforcement, provide the same coating type to all that element’s reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.
Epoxy coating: High build, high solids, chemically resistant coating.
— Thickness: 200 µm minimum.
Galvanizing: To AS/NZS 4680, as follows:
— Sequence: If fabricating after galvanizing, repair damaged galvanising and coat cut ends.
— Zinc coating (minimum): 600 g/m².

Tie wire
General: Annealed steel 1.25 mm diameter (minimum).
External and corrosive applications: Galvanized.

3 EXECUTION

3.1 FORMWORK

General
Requirement: As documented in the Formed surface finishes schedule.

Preparation
Cleaning: Before placing concrete, remove free water, dust, debris and stains from the formwork and the formed space.

Bolt holes
Removable bolts: Remove tie bolts without damaging the concrete.
Formwork tie bolts left in the concrete: Position more than 50 mm from the finished surface.
Bolt hole filling: Provide material with durability and colour matching the concrete.
Recessed filling: Fill or plug the hole to 6 mm below the finished surface.

**Corners**
Work above ground: Chamfer at re-entrant angles, and fillet at corners.
Face of bevel 25 mm.

**Embedments**
Fixing: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

**Openings**
Inspection: In vertical formwork provide openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams.
Access: For thin walls and columns, provide access panels for placing concrete.

**Release agents**
Application: Before placing reinforcement, apply a release agent to linings and facings.

### 3.2 REINFORCEMENT

**Dowels**
Fixing: If a dowel has an unpainted half, embed in the concrete placed first.
Tolerances:
- **Alignment:** 1:150.
- **Location:** ± half the diameter of the dowel.
Grade: 250 N.

**Cover**
Concrete cover generally: To AS 3600 clause 4.10.
Concrete cover for structures for retaining liquids: To AS 3735.
Concrete cover for residential ground slabs and footings: To AS 2870.

**Supports**
Proprietary concrete, metal or plastic supports: To AS/NZS 2425 and as follows:
- Able to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal, located within the concrete cover zone, or are used with galvanized or zinc-coated reinforcement.
Spacing:
- **Bars:** ≤ 60 diameters.
- **Mesh:** ≤ 800 mm.
Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

**Projecting reinforcement**
Protection: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

**Tying**
General: Secure the reinforcement against displacement at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.
Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.
Bundled bars: Tie bundled bars in closest possible contact. Provide tie wire of at least 2.5 mm diameter and spaced not more than 24 times the diameter of the smallest bar in the bundle.
Columns: Secure longitudinal column reinforcement to all ties at every intersection.
Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.
3.3 CONCRETE

General
Conformance: As documented in the Concrete properties schedule – performance.

Elapsed delivery time
General: Make sure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the Elapsed delivery time table. Do not discharge at ambient temperature below 10°C or above 30°C unless approved heating or cooling measures are taken to deliver concrete within the range 5°C to 35°C.

<table>
<thead>
<tr>
<th>Concrete temperature at time of discharge (°C)</th>
<th>Maximum elapsed time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 – 24</td>
<td>120</td>
</tr>
<tr>
<td>24 – 27</td>
<td>90</td>
</tr>
<tr>
<td>27 – 30</td>
<td>60</td>
</tr>
<tr>
<td>30 – 32</td>
<td>45</td>
</tr>
</tbody>
</table>

Pre-mixed supply
Addition of water: To AS 1379 clause 4.2.3.
Transport method: Select to prevent segregation, loss of material and contamination of the environment, and not to adversely affect placing or compaction.

Site mixed supply
Emergencies: If mixing by hand, provide details.
Plant: Mix concrete in a plant located on the construction site.

3.4 PLACING AND COMPACTION

Placing
Horizontal transport: Use suitable conveyors, clean chutes, troughs, hoppers or pipes.
Methods: Avoid segregation and loss of concrete, and minimise plastic settlement. Maintain a nominally vertical and plastic concrete edge during placement.
Horizontal elements: Place concrete in layers not more than 300 mm thick. Compact the following layer into previous layer before previous layer has taken initial set.

Compaction
Methods: Use immersion and screed vibrators accompanied by hand methods as appropriate to remove entrapped air and to fully compact the mix.
Vibrators: Do not allow vibrators to contact set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Placing records
Log book: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:
- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain
Protection: During placement and before setting, protect the surface from damage.

Time between adjacent placements
General: As documented in the Minimum time delay schedule.

Vertical elements
Placement: Limit the free fall of concrete to maximum of 2000 mm.
Placing in cold weather
Cement: Do not use high alumina cement.
Temperature limits: Maintain the following temperature limits:
   - Freshly mixed concrete: \(\geq 5^\circ\text{C}\).
   - Formwork and reinforcement before and during placing: \(\geq 5^\circ\text{C}\).
   - Water: Maximum 60°C when placed in the mixer.
Severe weather: If severe weather conditions are predicted, use high early strength cement.
Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is within the documented limits.
Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.
Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any formwork, materials, and equipment coming in contact with the concrete.
Freezing: Prevent concrete from freezing.

Placing in hot weather
Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses.
Temperature limits: Maintain freshly mixed concrete at the following temperature limits:
   - Normal concrete in footings, beams, columns, walls and slabs: \(\leq 35^\circ\text{C}\).
   - For concrete strength grade less than 40 MPa with section thickness \(\geq 1\) m in all dimensions: \(\leq 27^\circ\text{C}\).
   - For concrete strength grade 40 MPa or greater with section thickness \(\geq 600\) mm in all dimensions: \(\leq 27^\circ\text{C}\).
   - Formwork and reinforcement before and during placing: \(\leq 35^\circ\text{C}\).
Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.
Temperature control: Select one or more of the following methods of maintaining the temperature of the placed concrete at 35°C or less:
   - Cool the concrete using liquid nitrogen injection before placing.
   - Cover horizontal transport containers.
   - Spray the coarse aggregate using cold water before mixing.
   - Use chilled mixing water.

Placing under water
General: Do not place under water unless conditions prevent dewatering.
Minimum cement content for the mix: Increase by 25%.

### 3.5 CURING

**General**
Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:
   - Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to the following, unless accelerated curing is adopted:
     - Fully enclosed internal surfaces/Early age concrete: 3 days.
     - Other concrete surfaces: 7 days.
   - End of curing period: Prevent rapid drying out at the end of the curing period.
   - Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

**Curing compounds**
Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for the required curing period after application.
Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render.

Self-levelling toppings: If used also as curing compounds, conform to AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

**Cold weather curing**

Temperature: Maintain concrete surface temperatures above 5°C for the duration of the curing period.

**Hot weather curing**

Curing compounds: If curing compounds are proposed, provide details.

Protection: Select a protection method from the following:
- If the concrete temperature is more than 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is more than 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

**Water curing**

Method: Select a method of ponding or continuously sprinkling to prevent damage to the concrete surface during the required curing period.

### 3.6 UNFORMED SURFACES

**General**

Surface finish: As documented in the **Unformed surface finishes schedule**.

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

**Surface repairs**

Method: If surface repairs are required, submit proposals.

**Finishing methods – primary finish**

Machine float finish:
- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating finish, as follows:
- Use power or hand steel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, re-trowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy finish, uniform in texture and appearance, and free of trowel marks and defects.

Wood float finish: After machine floating, use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratch finish: After screeding, use a stiff brush or rake drawn across the surface before final set, to produce a coarse scored texture.

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

Exposed aggregate finish: After floating and when concrete has stiffened, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Rinse the surface with water.
3.7 COMPLETION

Formwork removal
Extent: Remove formwork, other than profiled steel sheeting composite formwork and lost formwork, including formwork in concealed locations.
Timing: Do not disturb formwork until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:
- General: To AS 3600 where it is more stringent than AS 3610.1.

Protection
General: Protect the concrete from damage due to construction loads, physical and thermal shocks, and excessive vibrations, particularly during the curing period.
Surface protection: Protect finished concrete surfaces and applied finishes from damage.

MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Key quality verification requirements</th>
<th>Maximum lot size</th>
<th>Minimum test frequency</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust blocks, anchor blocks and concrete encasement</td>
<td>Consistency – slump</td>
<td>15 m³</td>
<td>1 per load</td>
<td>AS 1012.3.1</td>
</tr>
<tr>
<td></td>
<td>Compressive strength (7 and 28 day)</td>
<td>15 m³</td>
<td>2 pairs per 15 m³</td>
<td>AS 1012.1 AS 1012.8.1 AS 1012.9</td>
</tr>
</tbody>
</table>

3.8 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>0310.1 Inline thrust blocks</td>
<td>m³</td>
<td>All costs associated with the supply and placing of formwork, reinforcement, concrete and curing. Also confirm bearing pressure and key into existing ground.</td>
</tr>
<tr>
<td>0310.2 Other thrust blocks</td>
<td>m³</td>
<td>All costs associated with the supply and placing of formwork, reinforcement, concrete and curing. Also confirm bearing pressure and key into existing ground.</td>
</tr>
</tbody>
</table>
1101 TRAFFIC MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Traffic management: Provide management for the safe movement of traffic and the protection of persons or property through and/or around the work site. Construct the Works with the least possible obstruction to traffic.

Authority requirements: This worksection does not override any applicable State or Local Government legislation and is to be read in conjunction with AS 1742.3 and the applicable State Road Authority traffic management specification.

1.2 CROSS REFERENCES

General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0136 General requirements (Construction).
- 0161 Quality management (Construction).
- 1102 Control of erosion and sedimentation (Construction).
- 1111 Clearing and grubbing.
- 1121 Open drains.

1.3 STANDARDS

General

Traffic control: To AS 1742.3 for works on or adjacent to roads.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:
- Competent person: A person who has, through a combination of training, qualification and experience, acquired knowledge and skills enabling that person to correctly perform a specified task.
- Road safety barrier system: A physical barrier separating the work area and the travelled path, designed to resist penetration by an out of control vehicle and as far as reasonably practicable, to redirect out of control vehicles back into the travelled path.
- Traffic control plan (TCP): A drawing showing signs and devices arranged to warn traffic and to guide it around, past or, if necessary, through a work site or temporary hazard.
- Traffic controller: A person whose duty is to control traffic at a work site.
- Traffic management plan (TMP): A set of procedures, which may include drawings, showing how traffic is to be managed during construction. The plan describes the proposed work activities, their impact on the roadway and road users, and how these impacts are being addressed.
- Vehicle movement plan (VMP): A drawing showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream.

1.5 SUBMISSIONS

Authority approvals

Seek "Approval to Work" Permit from Department of Transport and Main Roads. Contractor must maintain at least one traffic lane at all times (day and night). Prepare and implement traffic control plans as per MUTCD.
Requirement: Submit details of all authority approvals before commencing the works for which the approval is granted, including the following:
- Plan(s): Submit evidence of approvals from Councils and other authorities for temporary traffic arrangements.

Temporary speed zoning: Submit evidence of approval of temporary speed zoning requirements from the Local Traffic Committee and/or State road authority.

Execution details
Plan(s): Submit the plan(s) as required in ANNEXURE – PROJECT PLAN REQUIREMENTS conforming to the following:
- Plan requirements: Conform to PRE-CONSTRUCTION PLANNING, as appropriate.
- Access: Include proposal of alternative access to roads and properties for vehicles and pedestrians for work affecting side roads and existing accesses.
- Construction under traffic: If required, include traffic arrangements details and methods for traffic control.

Records
Traffic controllers: Submit names of proposed traffic control personnel with a signed declaration that they are appropriately trained in the traffic control duties to AS 1742.3 clause 4.10.6.

1.6 INSPECTIONS

Notice
General: Give notice so that inspection may be made of the following:
- Temporary roadways and detours: Completed stormwater drainage, wearing surface and linemarkings, and street lighting.
- Traffic control signs and devices: Completed installation including signals, safety barriers and containment fences.
- Plant delineation: If plant encroaches on traffic travel paths, completed installation of warning devices.
- Access: Completed alternative access for vehicles and pedestrians.
- Opening temporary roadways and detours to traffic: Completed roadway/detour and associated control measures.
- Opening completed work: Reinstatement of the area affected by the Works.

2 PRE-CONSTRUCTION PLANNING

2.1 TRAFFIC MANAGEMENT

Traffic management plan (TMP)
Plan components: Prepare a TMP with the following:

*Contractor must maintain at least one traffic lane at all times (day and night).*
- Traffic staging plan: If required, include details of the traffic staging arrangement and the time periods when each stage is in operation.
- Identify level of management provisions.
- Risk assessment: Identify and address risks associated with road safety, traffic management and road network issues specific to the site.
- Traffic control plan(s).
- Vehicle movement plan(s) showing travel paths for vehicles including for delivery, personnel and contractor’s vehicles.
- Provisions for access to adjoining properties affected by the Works.
- Safe passage measures for workers/personnel, pedestrians and cyclists.
- Temporary speed zoning changes.
- Design drawings for temporary roadways and detours, including alignment and surface levels, pavement width and cross section, wearing surface and drainage details.
- Names and contact details of personnel responsible for the maintenance of traffic control devices and temporary roadways outside normal working hours. Include evidence that these details have been provided to the local police.
Plan preparation: Use a competent person to prepare the TMP.
Site copy: Keep a copy of the approved TMP on-site at all times. Use the plan for maintaining traffic control devices and to check traffic arrangement.

Level of management provisions
Requirement: Conform to one of the following levels of provisions to AS 1742.3 clause 2.2.1:
- Short term and mobile works not involving full or part road closure.
- Works involving relatively simple part-roadway closures.
- Works involving complex traffic arrangements or staged works or both.

Traffic control plan (TCP)
Requirement: Prepare a TCP showing the following, as appropriate:
- Types and locations of permanent regulatory and advisory signs.
- Types and locations of temporary signs, including advance warning signs and speed zone signs.
- Pavement marking details, including types of delineation required, turning arrows, stop/holding lines and other road markings, types and positions of raised pavement markers and other delineation devices.
- Locations of permanent and temporary traffic signals.
- Locations and lengths of tapers and buffer zones.
- Locations of traffic controllers.
- Locations of entry and exit gates to the working areas, individually numbered and signposted.
- Pedestrians and cyclists paths.
- Details of side roads and access for adjoining properties and parking.
- Locations of safety barriers, barrier systems and end terminals.
- Locations of temporary lighting.

Signage
Signage application/function: In the TCP, provide signs for the following:
- Protection of workers.
- To adequately warn of changes in surface condition and the presence of personnel or plant engaged in work on the road.
- For safely guiding road users through, around or past the work site.

Safety barriers
Location: To AS 1742.3 clauses 2.4.5 and 3.10.3, and at temporary embankments where the vertical height between the edge of the shoulder and the intersection of the embankment slope and natural surface exceeds 2 m.
Temporary embankment barriers: Corrugated steel or precast concrete safety barriers.

Road safety audit
Safety audits: If required, arrange for a commencement meeting, with the road safety auditor present, before implementing any traffic control measure to determine inspection points for auditing.
Audit report: After auditing of the TMP/TCP and receipt of the audit report, obtain directions for amending the plan documents. If amendment is required, obtain approval of revised documents before implementing control measures.

3 MATERIALS

3.1 SIGNS

Standards
Sign selection: To AS 1742.3.
Manufacturing of signs: To AS 1743.
Details of each letter: To the figures in AS 1744.
Retroreflective materials: Class 1 material conforming to AS/NZS 1906.1.
Sign size: To AS 1742.3 Tables 3.1 to 3.12, the figures in AS 1743 and ANNEXURE – SUPPLEMENTARY TEMPORARY WARNING SIGNS.
Signs for night work: If work area is outside of the car headlight beams, provide floodlighting to AS 1742.3 clause 2.4.3.

Flashing arrow signs: To AS 4192 and installed to AS 1742.3 clause 3.12.

Other work site approach/departure signs

Signs supplementary (ST/SW) to those in AS 1742.3 and AS 1743: To ANNEXURE – SUPPLEMENTARY TEMPORARY WARNING SIGNS.

Application: Provide warning signs as follows:
- Heavy machinery crossing: SW5-22.
- Cycle hazard grooved road: ST1-10 and T1-10 to AS 1743 if the road is grooved and is a hazard to cyclists.
- Tar spraying possible short delay: ST3-1 and T3-1 to AS 1743 for bituminous surfacing works.
- Changed traffic conditions ahead: T1-1, T1-6, T1-23, T2-6 and T2-2 to AS 1743 on long term works, side tracks and detours.

3.2 BARRIERS AND FENCING

Barrier boards

Size, placement, material/colour: To AS 1742.3 clause 3.8.3(a).

Trestle supports:
- Material: Timber, metal or other suitable material.
- Colour: Yellow.
- Stability: Keep trestle in place with concrete blocks or sandbags.
- Bases: Keep the bases of trestles within the ends of the barrier boards.

Warning lamps: Provide barrier boards or trestles which allow for the mounting of traffic warning lamps.

High visibility flexible mesh fencing

Plastic mesh fencing: To AS 1742.3 clause 3.10.1(b).

Application: fencing for pedestrian containment or containment of workers.

Support: Fastened to steel star pickets/posts with cable ties or drawstring.

Location: As documented in the TCP.

Safety barriers

Road safety barrier systems: To AS/NZS 3845.

Temporary delineators

Material and erection: To AS 1742.3 clause 3.9.2 and 2.5.2.

Location: Erect parallel to and in close proximity to traffic, as documented.

Boom barriers

Type and location: As documented.

Cones and bollards

Requirement: To AS 1742.3 clause 3.9.1.

Spacing: To AS 1742.3 Table 3.7.

Conditions of use: Unless cones are firmly fixed in position, use only while work is in progress or in locations where an employee is present to re-instate cones dislodged by traffic. Otherwise, use bollards or barriers.

Cones and bollards used under night conditions: Provide cones and bollards with retroreflective bands conforming to AS 1742.3.

4 EXECUTION

4.1 GENERAL

Traffic management

Requirement: Provide the following, as documented:
- Personnel, plant and traffic control devices.
- Temporary roadways and detours.
- Arrangement for traffic.
Safety: Provide traffic control measures with minimal safety risk and inconvenience to the workers and road users at all times, including pedestrians and cyclists.

Road safety audits
Construction phase auditing: If safety audits are required, obtain agreement for inspections and arrange for a road safety auditor to inspect the traffic control measures during daytime and night time conditions at the inspections points. If the measures are ineffective, revise the TMP and implement the appropriate measure.

Auditing procedures: To AUSTROADS AGRS06.
Revisions to the TMP: Obtain agreement for amendments/decisions, and document and implement the amendments.

4.2 PERSONNEL
Traffic controllers
Application, equipment and position: To AS 1742.3 clause 4.10.
Recognition marks: Controllers to wear a distinguishing mark on their outer garment indicating their authority.
Location of traffic controllers: Place to AS 1742.3 and as follows:
- One traffic controller at the head of each traffic queue whilst it is halted.
- An additional traffic controller at the tail end of the queue where there is restricted sight distance and the possibility of approaching traffic colliding with the tail of the queue.
Where both ends of the work are not intervisible: Provide the traffic controller at each end with a two-way radio. Where this is not possible, station an intermediate traffic controller at a location where the extremities of the work is visible to provide cues to both controllers.
Night work control: In conjunction with a STOP/SLOW hand bat, use an illuminated red cone wand (torch) with a minimum capacity of 30,000 candela.
Night time lighting of traffic controller and work area: If floodlighting of the traffic controller and the work area adjacent is required, position floodlights above the work area, directed downwards and inclined slightly to illuminate the face of the STOP/SLOW bat.
- Floodlighting and glare: Make sure lights do not create glare for approaching drivers.
- Effects on neighbouring properties: Make sure high lighting levels do not adversely affect neighbouring residential property.

Approved clothing for work personnel
Clothing and use: To AS 1742.3 clause 3.16.4.
Potentially flammable clothing: Do not wear close to work likely to generate flame or hot splatter/molten metal.

4.3 PLANT AND CONTROL DEVICES
Plant delineation
Plant and equipment: Where plant and equipment encroaches on traffic travel paths, direct traffic around encroachment as follows:
- In daylight conditions: Attach a fluorescent red flag to the outer end of the projection.
- In night or poor light conditions: Provide an additional traffic controller with an illuminated red wand.
Night time clearance: If traffic is permitted to use the whole or part of the existing road, remove all plant items and similar obstructions from the normal vehicle path to provide minimum 6 m lateral clearance where practicable, with minimum 1.2 m clearance of other dimensions.
Warning lamps: Light plant and equipment within 6 m of the normal vehicle path with minimum two yellow steady lamps suspended vertically from the point of obstruction nearest to a traffic lane, and one lamp at each end of the obstruction on the side furthest away from the traffic lane.
Traffic control signs and devices
Arrangement and placement of traffic control devices: To the approved Traffic control plan.
Signs no longer required: Cover and/or remove temporary control devices no longer required without delay to maintain unambiguous safe guidance to traffic.
Control device maintenance: Maintain control devices so that they are in good working order and in the correct positions day and night. Maintain signs so that they are neat, clean, clear and legible.
Non-conforming signs and devices: Repair or replace to AS 1742.3 clause 2.6.3.
Sign installation: To AS 1742.3 clause 2.1 (i) to (vii) and clause 4.7.5.

**Temporary speed zoning**

Requirement: If temporary speed limit has been approved by the Local Council Traffic Committee or State Road Authority, provide temporary speed zoning signs complete with posts and fittings.

Speed limit: To AS 1742.3 Table 4.7 and the applicable State Road Authority specification.

Temporary speed zoning signs: Erect signs, cover the signs when the speed zone is not in use, and remove the signs when the speed zone is no longer required.

Operation diary: Keep a diary recording operation times of the speed zone.

### 4.4 CONSTRUCTION UNDER TRAFFIC

**Arrangement for traffic**

*Contractor must maintain at least one traffic lane at all times (day and night).*

Permission to construct under traffic: If a temporary roadway or a detour is not provided or available, construction under traffic may be permitted, if the following is provided:

- Through traffic on a two lane roadway: Minimum 3.5 m lane width.
- Multilane roads: Minimum 3.5 m lane width in both directions.

Notification: Give minimum 5 working days’ notice before carrying out work.

Carriageway restoration: Restore carriageway to a safe and trafficable state for through traffic before ceasing work each day.

### 4.5 OPENING TO TRAFFIC

Opening completed work

Notice: Provide at least 10 working days’ written notice of the date of opening the Works to traffic.

Obtain agreement for the procedure for opening including with the local Police.

Permanent signs and markings: Complete all permanent signposting, pavement markings, safety barriers and traffic signals required to complete the Works before opening to traffic.

Removal of temporary traffic control devices: Remove all temporary control devices no longer required for the safety of traffic, when part or all of the Works are opened to traffic.

Restoration: Restore the area to a condition equivalent to that at commencement.

### 5 ANNEXURES

#### 5.1 ANNEXURE – PROJECT PLAN REQUIREMENTS

<table>
<thead>
<tr>
<th>Plan type</th>
<th>Required?*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic guidance scheme/s (TGS)</td>
<td>Yes ☒</td>
</tr>
<tr>
<td>Traffic management plan (TMP)</td>
<td>Yes ☐</td>
</tr>
<tr>
<td>Traffic control plan (TCP)</td>
<td>Yes ☐</td>
</tr>
<tr>
<td>Traffic staging plan (if required)</td>
<td>Yes ☐</td>
</tr>
<tr>
<td>Road safety audit of TMP/TCP</td>
<td>Yes ☐</td>
</tr>
<tr>
<td>Vehicle movement plan (VMP)</td>
<td>Yes ☐</td>
</tr>
</tbody>
</table>

*Check the box applicable for the project.

#### 5.2 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS, Execution details Plan(s)</td>
<td>H</td>
<td>Plans and documents of the TGS and work on roads permit.</td>
<td>14 days from contract commencement 2 weeks if pavement/drainage works is not required, 4 weeks if pavement/drainage works is required.</td>
<td>Commencement.</td>
</tr>
<tr>
<td>Clause and description</td>
<td>Type*</td>
<td>Submission/Inspection details</td>
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<td>Commencement.</td>
</tr>
<tr>
<td>INSPECTIONS, Notice Traffic control signs and devices</td>
<td>W</td>
<td>Completed installation of signs and devices.</td>
<td>1 day before opening to traffic</td>
<td>-</td>
</tr>
<tr>
<td>INSPECTIONS, Notice Opening completed work</td>
<td>H</td>
<td>Reinstated area affected by the Works.</td>
<td>12 days before switching traffic</td>
<td>Opening of completed work to traffic</td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point

5.3 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1101.1 Traffic management</td>
<td>Lump sum item</td>
<td>All costs associated with the documentation and approvals of: - The design of temporary roadways and detours, traffic switching operations, the provision of traffic controllers, signposting, roadmarkings, raised pavement markers, lights, barriers. - Other traffic control devices required for the safe movement of traffic and the protection of persons and property. Progress payments work done under this item is to be made on a pro-rata basis, as appropriate for the duration of the Contract.</td>
</tr>
</tbody>
</table>

5.4 ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

- AS 1742 Manual of uniform traffic control devices
- AS 1742.3 2009 Traffic control for works on roads
- AS 1742.14 2014 Traffic signals
- AS 1743 2001 Road signs - Specifications
- AS 1744 2015 Standard alphabets for road signs
- AS 1906 Retroreflective materials and devices for road traffic control purposes
- AS/NZS 1906.1 2007 Retroreflective sheeting
- AS/NZS 3845 1999 Road safety barrier systems
- AS 4191 1994 Portable traffic signal systems
- AS 4192 2006 Illuminated flashing arrow signs
<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTROADS AGRD</td>
<td>Guide to road design</td>
</tr>
<tr>
<td>AUSTROADS AGRD03</td>
<td>Geometric design</td>
</tr>
<tr>
<td>AUSTROADS AGRS</td>
<td>Guide to road safety</td>
</tr>
<tr>
<td>AUSTROADS AGRS06</td>
<td>Road safety audit</td>
</tr>
<tr>
<td>AUSTROADS AGTM</td>
<td>Guide to traffic management</td>
</tr>
<tr>
<td>AUSTROADS AGTM06</td>
<td>Intersections, interchanges and crossings</td>
</tr>
</tbody>
</table>
1102 CONTROL OF EROSION AND SEDIMENTATION (CONSTRUCTION)

1 GENERAL

1.1 RESPONSIBILITIES

General Requirement: Provide temporary and permanent measures to control erosion and sedimentation to the requirements of Erosion and sedimentation control plan as documented.

ESCP prepared by the contractor
Implementation: To control plans documented in PRE-CONSTRUCTION PLANNING.

1.2 CROSS REFERENCES

General Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0022 Control of erosion and sedimentation (Design).
- 0136 General requirements (Construction).
- 0161 Quality management (Construction).
- 0173 Environmental management (AUS-SPEC).
- 0257 Landscape - road reserve and street trees.
- 1101 Traffic management.
- 1111 Clearing and grubbing.
- 1121 Open drains

1.3 STANDARDS


1.4 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- ARI: Average Recurrence Interval.
- ESCP: Erosion and sediment control plan.
- NTU: Nephelometric Turbidity Units.

Definitions
General: For the purposes of this worksection the following definitions apply:
- Erosion: The wearing away of land by the action of rainfall, running water, wind, moving ice or gravitational creep. Soil detachment (erosion) occurs when the erosive forces exceed the soil's resistance, causing the soil particles to move.
- NTU: A measure of water turbidity or the optical clarity of a liquid.
- Sediment: Sediment is the result of erosion, and consists of small detached soil particles. Sedimentation occurs when the transportation of detached soil particles ceases or slows and the soil particles then settle or fall out of suspension.
- Site sections: The site divided into sections based on the catchment area draining to each permanent drainage structure in the works, including the following:
  - Access and haulage tracks.
  - Borrow pits and stockpile areas.
  - Compound areas, including Contractor's facilities and concrete batching areas.
1.5 SUBMISSIONS

ESCP prepared by the contractor
Design documentation: Submit the following documents, if control plans are prepared or revised by the contractor:
- Erosion and Soil Sedimentation control plan (ESCP).
- Survey of embankments.
Calculations: Submit calculations and references supporting the design and maintenance requirements.

Execution details
Section plans: Before disturbing the natural surface of a particular site section, submit an ESCP only for that site section consistent with the previously approved ESCP.
Personnel: Submit staff names and contact details for installation, monitoring, upkeep and removal.
Working in a waterways and floodplains: Submit a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered including a copy of a Waterway Works Licence.
Drop inlet sediment control: Submit details of proposed alternative methods.

Reports

1.6 INSPECTIONS

Notice
General: Give notice so that inspection may be made of the following:
- General: Initial installation of sediment controls.
- Stockpile sites: Stockpiles are protected by approved erosion and contamination measures in the ESCP.
- Access and exit areas: Decontamination of vehicles.
- Areas not approved for clearing: Fencing and protection of areas.
- Diversion and catch drains: Construction and lining.
- Temporary sediment control: Temporary sediment traps and batter protection.
- Removal: Removal of temporary erosion and sedimentation works.
- Cleaning: Completion of cleaning.

2 PRE-CONSTRUCTION PLANNING

2.1 ESCP PREPARED BY THE CONTRACTOR

General
Requirement:

Schedules
Content requirement: Conform to the following:
- Work schedules for multiple contractors co-ordinated to avoid delays so that disturbed land does not remain unstabilised.
- Schedules for the construction of structures and the implementation of measures to control erosion and sedimentation programmed where possible to avoid seasonal intense rain storms.
- A work sequence with construction and stabilisation of culverts and surface drainage works at the earliest practical stage.

3 EXECUTION

3.1 SITE CONTROL AND PROTECTION

Dewatering
Requirement: Make sure that dewatering operations do not result in turbid water entering natural waterways and conform to the following:
- Treat contaminated water if turbidity exceeds 30 NTU.
- Only pump water into natural waterways if it is under safe limits to the regulatory water quality standards.
- Pump water to vegetated areas of sufficient width to remove suspended soil, or to sediment control structures.
- If discharge is to a natural waterway or a drainage system discharging to a natural waterway, monitor turbidity hourly.

**Dust control**
Requirement: Install measures for minimising health risk or loss of amenity due to emission of dust to the environment, and incorporate the following, if required:
- Suppression of dust by watering.
- Installation of wind fences.

**Management of stockpiles and batters**
Requirement: Manage soil stockpiles to minimise dust and sediment in run-off and conform to the following:
- Minimise the number and area of stockpiles and the time stockpiles are exposed.
- Keep topsoil and underburden stockpiles separate.
- Construct other protective measures including upstream diversion works and downstream sediment trapping devices.
- Height: < 2.5m.
- Stockpiles and batters slopes: No steeper than 2H:1V.
- Stockpiles and batters bare for more than 28 days: Stabilise by covering with mulch, anchored fabrics or seeding with sterile grass.
- Install sediment controls around unstabilised stockpiles and batters.
- Suppress dust on stockpiles and batters, as required.
- Stockpile protection: Install the following at the end of each working day:
  - Sandbags: Placed on downslope of stockpile to prevent movement.
  - Waterproof cover: Placed over stockpile material.
  - Sandbags, filter bags or fibre sausages: Locate to divert upslope flow of stormwater into grassed areas of the site and away from stockpiled material.
- Exclude timber and rubbish from stockpiles.

**Access and exit areas**
Decontamination measure: Decontaminate vehicles entering/exiting the site using shake-down or other approved methods.

**Working in waterways and floodplains**
Requirement: Minimise stress on aquatic communities and do not increase sediment load when working in waterways. Conform to the following:
- Plan in-stream works to minimise contact time.
- Establish special practices to minimise impacts on the waterway and disturbance of the banks.
- Stabilise the banks and the in-stream structures.
- Maintain minimum flows to make sure the viability of aquatic communities and do not limit the passage of fish up and downstream.
- Construct in-stream crossing during low flows, that are stable under expected vehicle loads and flow regimes.

### 3.2 EROSION AND SEDIMENTATION CONTROL MEASURES

**General**
Initial installation of sediment control: Prepare and present the works for inspection.

**Control measures**
Land clearance: Minimise in areas with highly erodible soils and steep slopes liable to water and wind erosion.
Runoff: Decontaminate in conformance with safe limits of regulatory waterway standards before dispersing. Disperse clean runoff to stable areas or natural watercourses
Drainage lines: Provide drainage to convey water through the works to minimise erosion generation. Identify drainage lines and install measures to control predicted stormwater and sediment loads generated in the mini catchment.

Limiting areas or erodible material exposed at any time: Limit to areas being actively worked.

Protection of areas not approved for clearing or disturbance: Clearly mark and fence off.

Clearing and grubbing: To the 1111 Clearing and grubbing worksection.

Control measures: Install and maintain for the duration of the contract, control measures including the following:

- Permanent drainage structures: Install before the removal of topsoil and commencement of earthworks within the catchment area of each structure.
- Permanent and temporary drainage works: Complete promptly to minimise exposure period of disturbed areas.
- Diversion and catch drains: Construct to prevent uncontaminated runoff from passing through the site and mixing with contaminated water. Construct and line catch drains before the adjacent ground is disturbed and before excavation.
- Contour and diversion drains: Install across exposed areas before, during and immediately after the clearing. Re-establish and maintain these drains during soil removal and earthworks operations.
- Cut off or intercept drains: Establish cut-off or intercept drains to redirect stormwater away from cleared areas, and sloping to stable (vegetated) areas or effective treatment installations.
- Sediment filtering or sediment traps: Install before and in conjunction with earthworks operations, to prevent contaminated water leaving the site.
- Berms: Construct along the edge of the formation leading to temporary batter flumes and short term sediment traps, to minimise loss of sediment during construction of embankments during fill placement.
- Progressive revegetation of site: To the 0257 Landscape - road reserve and street trees worksection as each site section is complete.

Maintenance

Maintenance of controls: Make sure each disturbed area has adequate means of containment of contaminated water. Restore and replace control measures as required.

Access areas: Provide and maintain access from within the road reserve, or from other acceptable locations, for cleaning out sedimentation control works.

Monitoring site performance

General: Maintain slopes, crowns and drains on all excavations and embankments, and make sure there is satisfactory drainage at all times. Do not allow water to pond on the works, unless ponding is part of an approved ESCP.

Ripped material remaining in cuttings and material placed on embankments: Seal off by adequate compaction to a smooth, tight finish.

Inspection: Inspect all erosion and sedimentation control measure as follows:
- At least daily when rain is occurring on site.
- At least weekly (even if work is not occurring on site).
- Within 24 hours prior to expected rainfall.
- Within 18 hours of a rainfall event of sufficient intensity and duration to cause on site runoff.

Rectification: Immediately rectify any defects revealed during inspection and revise ESCP, if required.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES

General

Requirement: Install temporary erosion and sedimentation control measures to areas where the natural surface is disturbed by construction, including roads, depot and stockpile sites.

Temporary drainage control

Temporary drains: Control runoff from exposed areas with temporary contour drains and/or temporary diversion drains. Progressively implement and, if required, alter as the work progresses.

Contour drains: Construct across the natural slope at approximately the same elevation as follows:
- Timing: Immediately after site is cleared, intercept and divert runoff from the site to nearby stable areas at non-erosive velocities.
- Form: Channel with a ridge on the lower side.
- Grade: 1% to 1.5%.
- Spacing intervals: 20 m to 50 m, depending on the erodibility of the exposed soil, as documented.

Diversion drains: Construct diversion drains across haul roads and access tracks when there is an erosion risk, due to steepness, soil erodibility or potential for concentrating runoff flow, as follows:
- Form: Channel with a ridge on the lower side to intercept and divert runoff from the road or track to stable outlets.
- Spacing: Not greater than that required to maintain runoff at non-erosive velocities.

**Temporary sediment control**

Temporary sediment traps: Construct devices to remove sediment from sediment-laden runoff flowing from areas of 0.5 ha or more before the runoff enters the stormwater drainage systems, natural watercourses or adjacent land.

Waste barriers: Construct and maintain to prevent debris from entering natural watercourses.

Batter protection: Minimise scour of newly-formed fill batters during and after embankment construction by diverting runoff from the formation away from the batter until vegetation is established.

**Drop inlet sediment control**

General: Construct drop inlet sediment traps and inlet control banks on completion of gully pits, as documented.

Functional requirement: Construct the inlet control banks, as required, to prevent the surface flows bypassing gully pits. Make sure the sediment traps remove sediment from the surface flow before it enters the drainage system.

Sediment traps and control banks: Conform to the following:
- Construct the drop inlet sediment traps and associated inlet control banks consisting of at least two courses of sandbags, containing a 10:1 sand/cement mix, as documented.
- Key the bags at least 25 mm into the surface, dampen and make sure cement is sufficiently hydrated, and tamp lightly to achieve a mechanical interlock between adjacent bags.

**Removal**

General: Remove all measures when revegetation is established on formerly exposed areas. Remove from the site, and dispose of, all materials and components used for the temporary erosion and sedimentation control works, as documented and in conformance with regulatory authorities’ requirements.

**3.4 CLEANING**

**Sedimentation control structures**

Progressive cleaning: Clean out, when accumulated sediment reduces the structure capacity of the control measure to 50% or less, or when sediment has built up to a point where it is less than 300 mm below the spillway crest and conform to the following:
- Removal of accumulated sediment: Use methods which will not damage the structures.
- Sediment disposal: Remove sediment to a nominated soil stockpile site or dispose in locations that sediments will not be conveyed back into the construction areas or into watercourses.
- Access: Maintain suitable access to allow cleaning out in all weather conditions.

**Completion**

Requirement: Clean, before Practical Completion of the Works.

Reinstatement: Reinstall surfaces including areas previously occupied by stockpiles and conform to the following:
- Within areas of permanent works: As documented.
- Areas outside permanent works: Reinstall to condition at commencement of contract.
4 ANNEXURES

4.1 ANNEXURE - SUMMARY OF HOLD AND WITNESS POINTS

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection</th>
<th>Submission/Notice details</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS ESCP prepared by the contractor Design documentation</td>
<td>H</td>
<td>Erosion and sedimentation control plan (ESCP)</td>
<td>14 days from contract commencement</td>
<td>Disturbance of natural surface</td>
</tr>
<tr>
<td>INSPECTIONS Notice General</td>
<td>W</td>
<td>Initial installation of sediment controls</td>
<td>3 days before commencement of bulk earthworks</td>
<td>Commencement of bulk earthworks</td>
</tr>
<tr>
<td>INSPECTIONS Notice Stockpile sites</td>
<td>W</td>
<td>Approved protection measures are in place</td>
<td>2 days before commencement of bulk earthworks</td>
<td>-</td>
</tr>
<tr>
<td>INSPECTIONS Notice Areas not approved for clearing</td>
<td>W</td>
<td>Fencing and protection of areas. Establish NO-Go zone</td>
<td>3 days before site disturbance</td>
<td>-</td>
</tr>
<tr>
<td>INSPECTIONS Notice Removal</td>
<td>W</td>
<td>Removal of temporary erosion and sedimentation works</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

*H = Hold Point  
W = Witness Point

4.2 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1102.1 Temporary erosion and sedimentation control measures</td>
<td>Lump sum</td>
<td>All costs associated with the installation, maintenance, inspection and removal of the temporary erosion and sedimentation control measures in accordance with approved EMP.</td>
</tr>
</tbody>
</table>

4.3 ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

- IECA Principles 2012: Best practice erosion and sediment control - Principles of construction site erosion and sedimentation control - A training tool for the construction industry
- IECA Book 5 2012: Best practice erosion and sediment control - A field guide for construction site managers
- IECA Book 6 2010: Best practice erosion and sediment control - Standard drawings
1111 CLEARING AND GRUBBING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide clearing, grubbing and removal of vegetation, debris and minor built structures for site works, as documented.

1.2 CROSS REFERENCES

General
Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:
- 0136 General requirements (Construction).
- 0161 Quality management (Construction).
- 0257 Landscape - road reserve and street trees.
- 1101 Traffic management.
- 1102 Control of erosion and sedimentation (Construction).

1.3 STANDARDS

General
Pruning of amenity trees: To AS 4373.

1.4 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviation applies:

Definitions
General: For the purposes of this worksection the following definitions apply:
- Dripline: The most outer reach of a tree’s branches.
- Weed: An invasive plant that degrades natural areas, reduces the sustainability or affects the health of people and animals. Species of weeds are included in local government listings.

1.5 SUBMISSIONS

Execution details
Establishment: Submit a method statement in conformance to PRE-CONSTRUCTION PLANNING, ESTABLISHMENT, Method statement.
Areas to be cleared outside the limits: If proposed, state the purpose for clearing and submit plan for approval.
Disposal of material: Material must be disposed of by legal means.

Records
Owners consent: Submit a copy of the owner’s written consent to enter property to remove timber for disposal, or for fallen timber to remain on private property.

Reports
Clearing report: Before clearing, inspect shrubs and trees and confirm no wildlife present.

1.6 INSPECTIONS

Notice
General: Give notice so that inspection may be made of the following:
- Limits of clearing: Peg out area for clearing.
2 EXECUTION

2.1 LIMITS OF CLEARING

General

Clearing permit: GHD on behalf of GRC is lodging a clearing permit with EHP as of July 2016. Further information to be provided as notice to tenderers.

Extent of clearing: As documented and areas occupied by the following:
- The completed Works. 4m offset from the pipe alignment edge.
- Erosion and sedimentation measures. 4m offset from the pipe alignment edge.
- Stockpile sites and borrow areas. Not permitted.

Protection of other vegetation
Existing shrubs, native grasses and ground covers: Protect areas by temporary fencing.

2.2 GRUBBING

General
Extent: All trees and stumps on, or within the limits of clearing which can not be felled and removed.
Depth of grubbing: Carry out grubbing operations to a depth of 0.5 m below the natural surface or 1.5 m below the top of the selected material zone.

Backfill
Holes and depressions: Immediately backfill holes or depressions remaining after grubbing trees and stumps to prevent the infiltration and ponding of water. Fill with soil material similar to the adjacent ground and compact the backfill material to at least the relative compaction of the material existing in the adjacent ground.

2.3 TREATMENT OF CLEARED VEGETATION

Milling
Timber species documented for milling: Trim branches to AS 1473.1. Stack in neat manageable stockpiles in approved locations.

Fauna habitat
Large tree trunks: Cut into transportable logs not less than 3.4 m in length any tree trunks nominated for salvage as fauna habitat logs and stockpile clear of construction.

Woodchip mulch
Prepare: Cut or split to a size to facilitate chipping or incorporation into the existing topsoil, as documented. All remaining timber that is not for milling, use as fauna habitat logs or for disposal offsite.

Woodchip mulch: Produce a woodchip mulch from crowns of shrubs and maximum 100 mm diameter branches of trees cleared under this worksection.

Dimensions of woodchip mulch: Two orthogonal dimensions less than 75 mm and 50 mm.
Timing: Chip cleared vegetation within 7 days of clearing to avoid excessive drying out of the vegetation and loss of seed stock.

2.4 DISPOSAL OF MATERIALS

General
Material must be disposed of by legal means.

2.5 COMPLETION

General
Requirement: At completion of clearing and grubbing, do not drive machinery or equipment over or disturb areas where there is no construction works proposed.

Warning signs on protected trees: Remove all tags.
3 ANNEXURES

3.1 ANNEXURE - SUMMARY OF HOLD AND WITNESS POINTS

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<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS, Execution details Establishment</td>
<td>H</td>
<td>Submit a method statement including proposed methods, equipment and materials</td>
<td>before commencement of clearing. Review clearing permit supplied by GRC.</td>
<td>Commencement of clearing</td>
</tr>
<tr>
<td>INSPECTION, Notice Limits of clearing</td>
<td>H</td>
<td>Peg out area for clearing</td>
<td>before commencement of clearing</td>
<td>Commencement of clearing</td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point

3.2 ANNEXURE - PAY ITEMS

<table>
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<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1111.1 Clearing and grubbing</td>
<td>m2</td>
<td>All costs associated with documentation, survey, inspection for fauna, clearing and grubbing. Also include all costs to shape and re-establish road batter and drains.</td>
</tr>
<tr>
<td>1111.2 Establish &quot;no-go&quot; zone</td>
<td>Lump sum</td>
<td>All costs associated with fencing of designated &quot;no go&quot; zones where G. capitata and C. megacarpa occur.</td>
</tr>
</tbody>
</table>

3.3 ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

| AS 1473 | Woodprocessing machinery |
| AS 1473.1 | 2000 | Primary timber milling machinery |
| AS 1744 | 2015 | Standard alphabets for road signs |
| AS 4373 | 2007 | Pruning of amenity trees |
| AS/NZS 4671 | 2001 | Steel reinforcing materials |
1152 Road openings and restoration (Utilities)

1 General

TRENCH PROFILE
- There are two types of trench profiles for this project i.e. “Type 1” and “Type 7”. “Type 1” trench profile is for pipe under the roadside and natural ground other than road. “Type B” trench profile is for pipe under the formed road. Refer to project drawing 16-047-001 Rev A for trench profiles.
- For clarity “Type 1” trench profile are shown below.
- Chainages for the "Type 7" trench profile is the applicable profile for road openings, 1152.

<table>
<thead>
<tr>
<th>Type 1 Trench Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chainage</strong></td>
</tr>
<tr>
<td>From</td>
</tr>
<tr>
<td>0.0 m</td>
</tr>
<tr>
<td>102.0 m</td>
</tr>
<tr>
<td>119.0 m</td>
</tr>
<tr>
<td><strong>Total length</strong></td>
</tr>
</tbody>
</table>

1.1 RESPONSIBILITIES

General
Requirement: Provide road opening and restoration works for installation of underground services within public road reserves or reserves under Council control including clearing, excavation, backfilling and restoration of surfaces, as documented. This worksection does not include the installation activities of the relevant utility services.

1.2 STANDARDS

General
Standards: To the relevant Road Authorities, Work Cover and Utility Authority’s specifications.

1.3 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- AADT: Annual average daily traffic.
- CRO: Council’s restoration officer.
- CTPO: Council’s tree preservation officer.
- GPR: Ground penetrating radar.
- MMDD: Maximum Modified Dry Density (modified compactive effort).
- MSDD: Maximum Standard Dry Density (standard compactive effort).
- QA: Quality assurance.

Definitions
General: For the purposes of this worksection, the following definitions given in the following standards apply. The text in brackets is additional to that in the standards.
- AS 1348:
  - Base/base course: One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed, which may be composed of fine crushed rock, natural gravel, broken stone, stabilised material, asphalt or Portland cement concrete.
. Carriageway: That portion of a road or bridge devoted particularly to the use of vehicles, that is between guide posts, kerbs, or barriers where these are provided, inclusive of shoulders and auxiliary lanes.

. Clearing: The removal of vegetation or other obstacles at or above ground prior to the commencement of earthwork, drainage, etc.

. Footpath/pathway: A public way reserved for the movement of pedestrians, wheelchairs and manually propelled vehicles.

. Overlay zone: The part of the trench backfill immediately over the utility service, for a maximum of 300 mm.

. Pavement: The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic (including the subbase and base course).

. Shoulder: The portion of the carriageway beyond the traffic lanes and contiguous and flush with the surface of the pavement.

. Subbase/subbase course: The material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required over the subgrade, or to prevent intrusion of the subgrade into the base, or to provide a working platform.

. Subgrade: The trimmed or prepared portion of the formation on which the pavement is constructed. Generally taken to relate to the upper line of the formation.

. Wearing course/wearing surface: The part of the pavement upon which the traffic travels.

- AS 4000:

. Contractor: The person bound to carry out and complete work under the Contract. (A Contractor may be internal or external to the Utility Authority).

. Principal: The Principal stated in the Annexure to the General conditions of contract. (The Utility Authority or service provider for whom the service installation and restoration work is being conducted.)

. Superintendent: The person stated in the Annexure to the General conditions of contract as the Superintendent or other person from time to time appointed in writing by the Principal to be the Superintendent and notified as such in writing to the Contractor by the Principal and, so far as concerns the functions exercisable by a Superintendent’s Representative, includes a Superintendent’s Representative.

Other definitions: For the purposes of this worksection the following definitions apply:

- Carriageway concrete pavements: Reinforced concrete pavements. Does not include roller compacted concrete bases and subbases.

- Council: The Local Government Authority for the area where the work is carried out.

- Hold Point: A mandatory verification position in the Contract beyond which work cannot proceed without the designated authorisation.

- Protected species: Plants identified by Council or other relevant authorities as protected species.

- Road authority: An authority with legislated responsibility for the management and maintenance of roads.

- Selected material zone: The top part of the upper zone of formation in which material of a specified higher quality is required.

- Utility Authority: Refer to Principal.

- Verge (rural): Defined area of the formation in rural roads outside the shoulder at the top of the batter slope.

- Witness Point: A nominated position, in the different stages of the Contract, where the option of attendance may be exercised by the Superintendent, after notification of the requirement.

1.4 TOLERANCES

Final carriageway restored surface tolerance

Maximum deviation from a 3 m straightedge: ± 15 mm, with no impact on traffic passing over the restored area, when checked 5 to 10 working days after completion.
1.5 SUBMISSIONS

Authority approvals
Requirement: Submit details of all authority approval before commencing the works for which the approval is granted, including the following:

- Trenching: Submit proof of approval for trenching by the public utility authorities and/or evidence of conformity with the authority requirements.
- Existing services: Provide written confirmation from the Authority that retired services are inactive.

Execution details
Environmental Management Plan: Submit an EMP conforming to the requirements of the relevant State authority.
Traffic management: Submit Traffic control plan for controlling vehicular and pedestrian traffic to PROVISION FOR TRAFFIC, Traffic management.

Products and materials
Trench backfill: Submit details of backfill material, including source.
- Submission time: 5 working days before start of backfill.

Records
QA assurance: Submit evidence of QA accreditation required by the Contract and a Quality plan for the Works.
- Submission time: 10 working days from commencement.

Work-as-executed drawings: Submit fully marked-up drawings for the whole of the Work.
- Drawings: Submit marked up and certified work-as-executed drawings for the whole of the Contract before issue of the Final Certificate.
- Submission time: Within 10 working days after approving completed restoration works.

Tests
Results: Submit results of testing to ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES.
Other tests: Submit results, as follows:
- Relative compaction: Submit results of compaction tests on completed backfill within 10 working days after testing.

1.6 INSPECTIONS

Notice
General: Give notice so that inspection may be made of the following:
- Set-out of works: Set-out lines and markings before commencement of excavation and any surface clearing work.
- Excavation: Completed excavation to the trench/foundation level.
- Trench backfill: Bedding and overlay material installation after backfill compaction.
- Surface restoration: Completed final surface installation of carriageway, and planting, as appropriate.
- Clean up: Completed restored work after cleaning.

2 Pre-construction planning

2.1 THE WORKS GENERALLY

Planning
Checklist: Conform to Flow diagram 1 in the Guide to codes and practices for streets opening or other State equivalent guide.
Existing utility services: Liaise and document the constraints, if any, on for excavation required by the Utility Authority.
Road opening permit: Obtain from the appropriate Roads Authority.
Authority approval
Approval by other public utility authorities: Where other public utilities exist in the vicinity of the Works, conform to one of the following before starting excavation:
- Obtain approval from the relevant authority for the proposed method of excavation.
- Incorporate the requirements of the relevant utility in the proposed work methods.

Environmental control measures
Requirement: Prepare and implement an EMP including erosion and sedimentation control measures, and noise and dust control measures, as required by the relevant environmental legislation, conforming to the requirements of the relevant Statutory Authorities.

2.2 PROVISION FOR TRAFFIC

Traffic management
- As per the technical spec 1101 Traffic Management

Access and notification
- N/A private properties

2.3 QUALITY ASSURANCE

Quality plan
Quality plan documents: Include all checklists, inspections, testing and documentation required in ANNEXURE – MINIMUM TESTING FREQUENCIES and as necessary for the Works to conform to the Contract documents.

Hold and Witness Points
Quality plan: Incorporate Hold and Witness Points into the checklists.
Hold Point sign-off: By the approved Contractor’s representative and the Superintendent.
Notice for inspections: Conform to INSPECTIONS.
Notice for Council officers: Minimum 24 hours, conforming to INSPECTIONS.

Hold Point approval by Contractor’s inspector
Sign-off: If allowed by the Quality plan, the Contractor’s nominated inspector may sign-off certain Hold Points. Approval will be determined by the Contractor’s performance in relation to the requirements of the Quality plan and the Contract.

Testing
Frequencies: Conform to ANNEXURE – MINIMUM TESTING FREQUENCIES. Retest non-conforming work and rectify where necessary.

Auditing
QA documents: The Contractor’s QA system may be audited as required. Provide information/documents where requested.

Costing provisions for QA
Additional costs: It is assumed all QA provisions are included in the costing for the Works and there will be no additional payment for conformance with the QA requirements.

3 Execution

3.1 GENERAL

Provision for traffic
Requirement: Conform to the approved Traffic control plan.
Traffic obstruction: Construct the Works in a safe manner with the least possible obstruction to vehicular and pedestrian traffic.

3.2 EXISTING UTILITY SERVICES

Marking
Locating and marking services: Before starting earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.
Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Excavation adjacent to utility services: Use only Utility Authority approved methods of excavation.

Telecommunication services: Contact the network service provider for information on underground services.

Gas services: Contact Jemena to ensure a representative can be on site during the time of excavation.

3.3 SET-OUT OF THE WORKS

Set-out
Initial limits: Set out limits of the proposed excavation for trenches, pits and chambers required for the utility service installation with minimal damage to existing surfaces.

Set-out markings: Legibly mark without permanently defacing any surface.

Adjusted limits: Adjust set-out to minimise or eliminate residual small portions of paving slabs, in the existing paved surfaces and joint patterns, in conformance with and Carriageways, as appropriate.

Restoration work: Conform to FINAL RESTORATION OF CARRIAGEWAY or the relevant road authority’s requirements.

Survey marks: For trench or surface work in the vicinity of Permanent or State Survey Marks, obtain protection or relocation requirements from the Land Information Centre of the State Authority responsible for survey records before commencement of Work.

3.4 WASTE DISPOSAL AND RECYCLING

Waste management
Waste/spoil material: Legally dispose to an appropriate recycling facility, disposal site or a legal waste management centre.

3.5 SURFACE TREATMENT REMOVAL

Street furniture Guidepost
Furniture likely to interfere with or be damaged by the Works: Remove and store furniture, including signage, seats and litter bins. Obtain direction for storage location.

3.6 EXCAVATION

Trenching
Dimensions: Excavate trenches to the standard widths and depths for the particular utility service installation or as documented.

Stabilisation of sides: Provide shoring, sheet piling or other necessary measures in conformance with statutory requirements.

Excavation level: Excavate trench or foundation to the planned bedding or foundation bottom level.

Trenching grade: < 0.5% fall.

Trench width: As required for the underground services in a shared trench agreement between respective service authorities.

Locating services
Existing underground services: Conform to EXISTING UTILITY SERVICES and Work near underground assets. Locate by exploratory excavation or by ground penetrating radar (GPR) before principal trench excavation.

Disused, retired or abandoned services: Before removal, obtain written confirmation from the appropriate Authority that services are inactive.

Removal of retired services: Excavate, remove all components and legally dispose off-site. Backfill the excavation in conformance with TRENCH BACKFILL.

Excavated material stockpiles
Excavated material: Segregate earth and rock material and stockpile for re-use in backfilling operations. Obtain approval for stockpile locations.

Stockpile locations: Obtain direction for stockpile locations. Do not stockpile against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation.
If stockpiling is not permitted: Dispose legally off-site.

**Unsuitable material**
Disposal: Remove any material from the bottom of the trench or at foundation level which is deemed unsuitable, legally dispose off-site and replace with backfill material in conformance with TRENCH BACKFILL.

Bottom of excavated trench/foundation level: Align with the slope of the utility service after unsuitable material has been removed and replaced.

**Contaminated or hazardous material**
Contaminated excavated material: If encountered, provide notification and dispose of the material to the requirements of the relevant Statutory Authority.

### 3.7 TRENCH BACKFILL

**Bedding, haunch, side and overlay zones**
Materials and installation: Conform to the Utility Authority’s requirements.

Side zone and overlay material: Install as required for the utility service being installed. Make sure material performance conforms to TRENCH BACKFILL and COMPACTION.

Geotextile: Install a geotextile sheet on any coarse overlay material to prevent piping of fines.

**Backfill**
Extent: Between the overlay zone and subgrade.
Material: Backfill with one of the following:
- 15:1 moist washed river sand/cement mix or non-cohesive backfill material.
- Stockpiled excavated material.
- Imported fill: If trench backfill material has been disposed off-site, use imported material free of stumps or roots, and capable of being compacted to COMPACTION.

**Water table**
Seepage zones: If sand/cement backfill is used, make sure natural seepage zones are not cut off by the impervious sand/cement material. Provide a pervious drainage layer or suitable subsoil drainage to maintain natural seepage.

Water in pervious material: If sand, crushed rock or similar pervious materials are used for trench backfill and bedding in a clay subgrade, make sure seepage water is not trapped in the pervious material, so that it saturates the adjacent clay subgrade and weakens it. If this occurs, install subsoil drainage for the bedding and backfill, or provide an impervious layer of material between any possible sources of seepage and the pervious backfill material.

Excavation below the natural water table: If required and the permanent exclusion of water from subgrade is not possible, submit proposals to protect the subgrade against weakening or obtain directions vary the excavation requirements.

**Selected material zone below subbase level**
Excavation through a selected material zone: If required, backfill within the selected material zone using materials conforming to the following:
- Free from stones larger than 100 mm maximum dimension.
- The fraction passing a 19 mm Australian Standard sieve, with a 4-day soaked CBR value is not less than that of the adjacent selected material zone to AS 1289.6.1.2.

**Verge and landscape areas**
Backfill material: Material passing through a 75 mm sieve, not containing any organic or deleterious material or reactive clay.

Landscaped areas: Place topsoil on the subgrade to the same thickness as the surrounding topsoil.

**Under carriageways**
Extent: To the subgrade level.
Backfill material: Use one of the following:
- Sand: Do not use if the bedding/overlay is coarse aggregate.
- Fine crushed rock/recycled concrete: Conform to Crushed rock and recycled concrete.
- Selected backfill material with an equivalent 4 day soaked CBR value to AS 1289.6.1.2, maximum particle size of 75 mm, and does not contain organic or deleterious material or reactive clay.
- Under carriageways: 15:1 sand/cement mix, not requiring compaction testing.

3.8 COMPACTION

Relative compaction
Sand/cement backfill material: No compaction testing is required.

Layers: Compact all material in maximum 150 mm compacted thick layers, unless it can be demonstrated that the required compaction can be achieved with thicker layers.

Moisture content: During compaction, adjust the moisture content of the material to attain the required compaction at a moisture content 60% to 95% of the apparent optimum moisture content, to AS 1289.5.7.1 (standard compaction).

Compacting adjacent to utility services: Use compaction methods which will not damage or cause misalignment of underlying or adjacent utility services and adjacent structures.

Compaction table

<table>
<thead>
<tr>
<th>Zone</th>
<th>Relative compaction</th>
<th>Density index (for non-cohesive materials)</th>
<th>Moisture content (% of optimum moisture content)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedding and overlay zones</td>
<td>Refer CMDG D12</td>
<td>Refer CMDG D12 70% density index</td>
<td>Refer CMDG D12</td>
</tr>
<tr>
<td>Backfill in cement stabilized zone</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2.3 road base</td>
<td>98% standard</td>
<td>N/A</td>
<td>Refer CMDG D12</td>
</tr>
</tbody>
</table>

Testing
General
Requirement: Test for all characteristics in conformance with ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES.

Quality verification: If material/product quality verification can be obtained from the supplier, documented tests need not be repeated.

3.9 SURFACE RESTORATION PREPARATION

Carriageway pavements and pathways
Rectification: Restore so that pavement/pathway is continuous and the condition is equivalent to that at start of Works.

Safety: Make sure all temporary and final restorations in carriageways and pathways is of the quality required maintain site safety for pedestrians and vehicular traffic.

Structures and surface pits
Levels: Set the levels of utility service surface pits, access chamber frames and lids and other affected structures so that carriageway pavements and footpaths can be restored to the original levels. If utility service surface box requires adjustment or replacement before restoration, liaise with other utility authorities.

Restoration approval
Before paving restoration work: Form up and prepare the areas to be restored and present the prepared areas for approval.

3.10 FINAL CARRIAGEWAY RESTORATION

General
Timing: Carry out final restoration as soon as practicable and within the contract required time.

Subbase/base layers and depths: Match the existing pavement.

- Type 2.3 subbase: 200mm thick layer depth to match the existing pavement.
3.11 COMPLETION

Clean up
Requirement: Upon completion of all restoration works, clean up the areas affected by the Works and associated construction activities, and restore to condition existing before commencement of the Works.

Waste: Remove and legally dispose of all formwork, waste and residue construction materials off-site including materials left at stockpiles.
Surfaces stained by construction activities: Clean and restore to approval.

4 Annexures

4.1 ANNEXURE – TYPICAL FINAL RESTORATION

4.2 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held**</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECTIONS, Notice</td>
<td></td>
<td>W</td>
<td>5 days before backfilling</td>
<td>Backfilling</td>
</tr>
<tr>
<td>Excavation</td>
<td></td>
<td>Completed excavation to the trench/foundation level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td></td>
<td>W</td>
<td>5 days before completing backfill</td>
<td>Surface restoration preparation</td>
</tr>
<tr>
<td>Trench backfill</td>
<td></td>
<td>Completed bedding and overlay material installation after compaction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>W</td>
<td>3 days before completion of works</td>
<td></td>
</tr>
<tr>
<td>Surface restoration</td>
<td></td>
<td>Final surface installation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>W</td>
<td>3 days before completion of works</td>
<td></td>
</tr>
<tr>
<td>Clean up</td>
<td></td>
<td>Restored work after cleaning.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point
**Hold Point release by the Superintendent, this may involve approval from the CRO to be coordinated by the Superintendent.

4.3 ANNEXURE – MINIMUM TESTING FREQUENCIES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Key quality verification requirements</th>
<th>Minimum test frequency</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench backfill under carriageways (15:1 sand/cement mix), materials supply</td>
<td>Material properties as documented.</td>
<td>Source of supply for each type of material used or suppliers test certificates. Minimum 1/50 m³.</td>
<td>As documented.</td>
</tr>
</tbody>
</table>
| Trench backfill under carriageways (15:1 sand/cement mix) and placement | Compaction | 1/2 layers/100 linear metres of trench or per 20 road openings for openings of less than 10 m² plan area whichever results in the most frequent testing. | AS 1289.5.1.1 for MSDD
AS 1289.5.2.1 for MMDD
AS 1289.5.6.1 for non-cohesive materials |
<p>| Moisture content during Trench backfill under carriageways (15:1 sand/cement mix) and placement | | 1/2 layers/100 linear | AS 1289.5.7.1 |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Key quality verification requirements</th>
<th>Minimum test frequency</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>compaction</td>
<td>metres of trench or 20 road openings of less than 10 m² plan area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base materials supply</td>
<td>Material properties as documented. Grading and Atterberg's limit</td>
<td>Source of supply for each type of material used. Minimum 1/50 m³.</td>
<td>As documented.</td>
</tr>
<tr>
<td>Base placement</td>
<td>Compaction and Moisture content during compaction</td>
<td>1/pavement layer/100 linear metres of trench.</td>
<td>AS 1289.5.1.1 AS 1289.5.2.1</td>
</tr>
<tr>
<td>Bedding and overlay zones</td>
<td>Material properties as documented. Grading and Atterberg's limit</td>
<td>source of supply for each type of material used. Minimum 1/50 m³.</td>
<td>As documented.</td>
</tr>
<tr>
<td>Bedding and overlay zones</td>
<td>Compaction and Moisture content during compaction</td>
<td>Max. lot 100 linear metres of trench Bedding - 1 test per lot Overlay - 1 test per lot</td>
<td>Refer CMDG D12 70% density index</td>
</tr>
</tbody>
</table>

### 4.4 ANNEXURE – PAY ITEMS

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1152.1 Trench excavation Disposal off-site</td>
<td>m³ as bank volume of excavation calculated as follows: The volumes of excavation for payment are computed as follows: - Trench width: 826 mm. - Trench depth: Average actual depth to underside of specified bedding. - Trench length: Actual excavation length.</td>
<td>The schedule rate is an average rate covering all types of material encountered during excavation. All costs associated with: - Excavation, including excavation and replacement of unsuitable material. - Replacement for overexcavation for any reason. - Protection of trees and treatment to cut tree roots. - All rock material encountered (refer to geotech report in additional documents) All costs associated with transporting off-site, disposal by legal means and any tipping fees applicable.</td>
</tr>
<tr>
<td>1152.2 Trench backfill</td>
<td>m³ measured as backfill compacted volume in place in the trench.</td>
<td>All costs associated with backfilling (including supply and installation of geotextile where appropriate), compaction and testing. For items 1152.2(1), and 1152.2(2) all costs associated with supply and delivery of imported material, including material for a selected material</td>
</tr>
</tbody>
</table>
### Pay items

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate inclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1152.3 Inadequate foundation material</td>
<td>m³</td>
<td>All costs associated with removing, disposing and reconditioning the unsuitable foundation material.</td>
</tr>
<tr>
<td>1152.4 Flexible base</td>
<td>m³</td>
<td>All costs associated with the supply, delivery, spreading and compaction of road base.</td>
</tr>
<tr>
<td>1152.5 Clean up</td>
<td>m² of carriageway and/or footway surface or other surface as applicable. Width and length documented.</td>
<td>All costs associated with the cleaning up of the Work site and transporting off-site and disposal of material including any applicable tipping fees.</td>
</tr>
<tr>
<td>1152.6 Street furniture - Guidepost</td>
<td>-No.</td>
<td>All costs associated with removing existing guideposts and replace with driveable steel guideposts.</td>
</tr>
</tbody>
</table>

#### 4.5 ANNEXURE – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

- **AS 1141**
  - Methods for sampling and testing aggregates
- **AS 1141.11.1**
  - 2009
  - Particle size distribution - Sieving method
- **AS 1289**
  - Methods of testing soils for engineering purposes
- **AS 1289.5.1.1**
  - 2003
  - Soil compaction and density tests - Determination of dry density/moisture content relation of a soil using standard compactive effort
- **AS 1289.5.2.1**
  - 2003
  - Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort
- **AS 1289.5.6.1**
  - 1998
  - Soil compaction and density tests - Compaction control test - Density index method for a cohesionless material
- **AS 1289.5.7.1**
  - 2006
  - Soil compaction and density tests - Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method)
- **AS 1289.6.1.2**
  - 1998
  - Soil strength and consolidation tests - Determination of the California Bearing Ratio of a soil - Standard laboratory method for an undisturbed specimen
- **AS 1348**
  - 2002
  - Glossary of terms - Roads and traffic engineering
- **AS 1742**
  - Manual of uniform traffic control devices
- **AS 1742.3**
  - 2009
  - Traffic control for works on roads
- **AS/NZS 2891**
  - Methods of sampling and testing asphalt
- **AS/NZS 2891.1.1**
  - 2013
  - Sampling - Loose asphalt
- **AS 2891.1.2**
  - 2008
  - Sampling - Coring method
- **AS/NZS 2891.3.1**
  - 2013
  - Bitumen content and aggregate grading - Reflux method
- **AS 4000**
  - 1997
  - General conditions of contract
- **AS 5488**
  - 2013
  - Classification of Subsurface Utility Information (SUI)
- **SOCC Guide**
  - 2009
  - Guide to codes and practices for streets opening
**1361 SEWERAGE SYSTEMS – RETICULATION (CONSTRUCTION)**

**TRENCH PROFILE**
- There are two types of trench profiles for this project i.e. "Type 1" and "Type 7". "Type 1" trench profile is for pipe under the roadside and natural ground other than road. "Type B" trench profile is for pipe under the formed road. Refer to project drawing 16-047-001 Rev A for trench profiles.
- For clarity "Type 1" trench profile are shown below.
- Chainages for the "Type 7" trench profile is the applicable profile for road openings, 1152.

**Type 1 Trench Profile**

<table>
<thead>
<tr>
<th>Chainage</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
</tr>
<tr>
<td>0.0 m</td>
<td>20.0 m</td>
</tr>
<tr>
<td>102.0 m</td>
<td>107.0 m</td>
</tr>
<tr>
<td>119.0 m</td>
<td>350.8 m</td>
</tr>
<tr>
<td>Total length</td>
<td>256.8 m</td>
</tr>
</tbody>
</table>

**SUBMISSIONS**

**Approvals**
Submissions: To the Superintendent’s approval. Submit the following for approval:
- Materials: Off-site certificates of components.
- Calculations: Survey set out of sewerage works and quantity calculations.
- Work-as-executed drawings: Include sewerage system information sheets and works.
- Components: Pipes and fittings.
- Samples: For conformity testing to relevant referenced documents.
- Technical data: Product information.
- Execution details: Refer to HOLD POINTS.

**HOLD POINTS AND WITNESS POINTS**

**Notice**
General: Give notice so that inspections and submissions may be made to the HOLD POINT table and WITNESS POINT table:

<table>
<thead>
<tr>
<th>Clause and description</th>
<th>Type*</th>
<th>Submission/Inspection details</th>
<th>Submission/Notice times</th>
<th>Process held</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMISSIONS, Variations</td>
<td>H</td>
<td>Proposals to adjust alignment or position</td>
<td>3 days before excavating trenches</td>
<td>Trench excavation</td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBMISSIONS, Quality</td>
<td>H</td>
<td>Details of Material Quality - Grading</td>
<td>2 days before backfill</td>
<td>Trench excavation</td>
</tr>
<tr>
<td>Bedding material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBMISSIONS, Variations</td>
<td>H</td>
<td>Details of unexpected soil conditions</td>
<td>3 days before preparing trench floor</td>
<td>Preparation of trench floor</td>
</tr>
<tr>
<td>Trench excavation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBMISSIONS,</td>
<td>W</td>
<td>Details of compaction</td>
<td>2 days before backfill</td>
<td>Trench backfill</td>
</tr>
<tr>
<td>WITNESS POINT table</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clause and description</td>
<td>Type*</td>
<td>Submission/Inspection details</td>
<td>Submission/Notice times</td>
<td>Process held</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>-------------------------------</td>
<td>-------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Compaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedding and overlay Zones</td>
<td></td>
<td>ratio/index</td>
<td>backfill completion</td>
<td>(Refer CMDG D12)</td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Any area that may contain material inadequate for support</td>
<td>2 days before preparing trench floor</td>
<td>-</td>
</tr>
<tr>
<td>Inadequate foundation material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Completed trench excavation</td>
<td>2 days before placement of bedding</td>
<td>Initial work lot then random audit</td>
</tr>
<tr>
<td>Trench floor preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Completed pipe laying, jointing and corrosion protection</td>
<td>2 days before trench backfilling</td>
<td>Initial work lot then random audit</td>
</tr>
<tr>
<td>Pipe embedment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>W</td>
<td>Acceptance testing being carried out</td>
<td>3 days before starting acceptance testing</td>
<td>-</td>
</tr>
<tr>
<td>Acceptance testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>H</td>
<td>Connecting to distribution tower</td>
<td>5 days before connecting to existing main</td>
<td>-</td>
</tr>
<tr>
<td>Connections</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSPECTIONS, Notice</td>
<td>H</td>
<td>Connecting to existing main and charging new main</td>
<td>5 days before connecting to existing main</td>
<td>-</td>
</tr>
</tbody>
</table>

*H = Hold Point, W = Witness Point

**MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Key quality verification requirements</th>
<th>Maximum lot size</th>
<th>Minimum test frequency</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials supply</td>
<td>Material quality – Supplier’s documentary evidence and certification of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- PE pipe</td>
<td>1 contract</td>
<td>1 per contract</td>
<td>AS/NZS 4130</td>
<td></td>
</tr>
<tr>
<td>- Gate valves</td>
<td>1 contract</td>
<td>1 per contract</td>
<td>AS/NZS 2638.1 or AS/NZS 2638.2</td>
<td></td>
</tr>
<tr>
<td>- Butterfly valves</td>
<td>1 contract</td>
<td>1 per contract</td>
<td>AS 4795.1 or AS 4795.2</td>
<td></td>
</tr>
<tr>
<td>- Air valves</td>
<td>1 contract</td>
<td>1 per contract</td>
<td>AS 4956</td>
<td></td>
</tr>
<tr>
<td>- Bedding and Overlay zones: Grading and Atterberg’s limits</td>
<td>50 m$^3$</td>
<td>1 per lot</td>
<td>Relevant CMDG specification</td>
<td></td>
</tr>
<tr>
<td>- Trench backfill (15:1 sand/cement)</td>
<td>50 m$^3$</td>
<td>1 per lot</td>
<td>Relevant CMDG specification</td>
<td></td>
</tr>
</tbody>
</table>
### Activity Key quality verification requirements Maximum lot size Minimum test frequency Test method

<table>
<thead>
<tr>
<th>Activity</th>
<th>Key quality verification requirements</th>
<th>Maximum lot size</th>
<th>Minimum test frequency</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siting and excavation</td>
<td>Geometry</td>
<td>1 line</td>
<td>1 per line</td>
<td>Survey</td>
</tr>
<tr>
<td>Thrust blocks, anchor blocks and concrete encasement</td>
<td>Consistency – slump 15 m³ 1 per load</td>
<td>AS 1012.3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compressive strength (7 and 28 day) 15 m³ 2 pairs per 15 m³</td>
<td>AS 1012.1 AS 1012.8.1 AS 1012.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chamber covers and frames</td>
<td>Geometry</td>
<td>1 cover/frame</td>
<td>1 per cover/frame</td>
<td>Measurement</td>
</tr>
<tr>
<td>Bedding and overlay zones</td>
<td>Compaction</td>
<td>100 lin. m</td>
<td>Bedding - 1 test per lot Overlay - 1 test per lot</td>
<td>CMDG D12 &amp; AS 1289.5.6.1 or AS 1289.5.7.1</td>
</tr>
<tr>
<td>Trench backfill (15:1 sand/cement mix) and placement</td>
<td>Compaction</td>
<td>100 lin. m</td>
<td>Backfill - 1 test every 2 layers per lot</td>
<td>CMDG D12 &amp; AS 1289.5.6.1 or AS 1289.5.7.1</td>
</tr>
<tr>
<td>Testing of pipelines</td>
<td>Pressure testing</td>
<td>1 line (max 1000 m)</td>
<td>1 per line</td>
<td>Refer to CMDG D12 &amp; WSA 03-2002</td>
</tr>
</tbody>
</table>

### Measurement and payment

**MEASUREMENT**

**General**

Payments made to the Schedule of Rates: this worksection, the drawings and **Pay items 1361.1 to 1361.10 inclusive**

Unpriced items: For each unpriced item listed in the Schedule of Rates, make due allowance in the prices of other items.

**Methodology**

The following methodology will be applied for measurement and payment:

Miscellaneous minor concrete work not included in the pay items in this worksection: To **0310 concrete combined**.

**PAY ITEMS**

<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1361.1 Trench excavation</strong></td>
<td>m³</td>
<td>All costs associated with:</td>
</tr>
<tr>
<td>Disposal off-site</td>
<td></td>
<td>- Setting out and associated survey.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excavation in earth and rock.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Restoration of surface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Replacement for over-excavation for any reason.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Control of stormwater runoff, temporary drainage and erosion and sedimentation control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Shoring and benching.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>transporting off-site, disposal off-site by legal means and any tipping fees</strong></td>
</tr>
<tr>
<td>Pay items</td>
<td>Unit of measurement</td>
<td>Schedule rate scope</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| 1361.2 Supply and install sewer pipe and fittings | Linear metre | All costs associated with:  
- Supply of pipe and fittings.  
- Wrapping pipeline or other protective measures.  
- Survey and setting out.  
- Junctions and property connection sewers.  
- Marker tape  
- Jointing (including connections).  
- Temporary bracing and strut ting of excavation.  
- All cutting and bevelling of pipe.  
- Any spare pipe required.  
- Quality conformance. |
| 1361.3 Supply and install valves | Each  
- Stop, air or scour valve and associated chamber or box installed. | All costs associated with the following:  
- Setting out. Excavation.  
- Formwork.  
- Supply and placing concrete.  
- Supply and installation of precast concrete.  
- Supply and installation of valves.  
- Supply and installation of cover and frames.  
- Supply and installation of marker posts, backfilling and disposal of spoil off site.  
- Temporary stockpiling before backfilling, control of stormwater runoff and erosion and sedimentation control. |
| 1361.4 Supply and install enveloper pipe and fittings | Linear metre | All costs associated with:  
- Supply of enveloper pipe  
- Supply of plastic centralisers  
- Installation of enveloper pipe by the way of pipe jacking  
- Pulling through sewer pipe with plastic centralisers installed correctly  
- Sealing open ends |
| 1361.5 Connection to existing | ‘Each’ connection to existing pipe | All costs associated with all the necessary works to blank off, sand fill, cut into or otherwise modify, provisions for by-pass and finish the system as shown on the drawings. |
| 1361.6 Trench backfill  
- 1361.6(1) From imported material.(sand bedding) | m³ measured as backfill compacted volume in place in the trench. | All costs associated with backfilling (including supply and installation of geotextile where appropriate), compaction, testing.  
For items 1361.6(1) all costs associated with supply and delivery of imported material, including material for a selected material zone where documented. |
<p>| 1361.7 Inadequate foundation material | m³ | All costs associated with removing, disposing and reconditioning the unsuitable foundation material. |
| 1361.8 Commissioning | Lump Sum | All costs associated with commissioning |</p>
<table>
<thead>
<tr>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule rate scope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>including all labour, test equipment and consumables to undertake and record the full commissioning procedure for all equipment and systems, and to carry out all necessary modifications and adjustments to the system so that it operates in conformance with the contract requirements.</td>
</tr>
</tbody>
</table>
| 1341.9 Supply and install marker posts | Each - Marker post  | All costs associated with the following:  
- Setting out.  
- Excavation.  
- Supply and placing concrete  
- Supply and installation of marker post with sign |
| 1361.10 Manuals                 | Lump Sum            | All costs associated with the following:  
The preparation and printing of the operating and maintenance manuals in conformance with the specification including necessary and appropriate work-as-executed drawings. |
CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

SEWERAGE NETWORK

D12

DESIGN & CONSTRUCTION GUIDELINE
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<th>CONTENTS</th>
<th>PAGE</th>
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</thead>
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<td>OBJECTIVE</td>
<td>4</td>
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<td>DEFINITIONS AND MATERIALS</td>
<td>5</td>
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<td>HYDRAULIC DESIGN</td>
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<td>PLANNED SERVICE AREA</td>
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<td>VENTING</td>
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<td>31</td>
</tr>
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<td>D12.26</td>
<td>LOCATION</td>
<td>31</td>
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</tbody>
</table>
Keeping the Capricorn Municipal Development Guidelines up-to-date

The Capricorn Municipal Development Guidelines are living documents which reflect progress of municipal works in the Capricorn Region. To maintain a high level of currency that reflects the current municipal environment, all guidelines are periodically reviewed with new editions published and the possibility of some editions to be removed. Between the publishing of these editions, amendments may be issued. It is important that readers assure themselves they are using the current guideline, which should include any amendments which may have been published since the guideline was printed. A guideline will be deemed current at the date of development approval for construction works.
D12 DESIGN AND CONSTRUCTION

D12.01 SCOPE

1. This Guideline sets out the requirements for the design and construction of the NON-TRUNK infrastructure sewerage network to achieve the Desirable Standards of Service in accordance with requirements of the Sustainable Planning Act and the Water Supply (Safety and Reliability) Act.

2. For the order of priority for interpretation of the following documents, applicable to a Local Government, refer to Table D12.02.1.

(a) CMDG D12 Sewerage Design and Construction Guideline
(b) CMDG Standard Drawings
(c) Sewerage Code of Australia WSA 02-1999
(d) Sewage Pumping Station Code of Australia WSA 04-2001
(e) AS2566 Buried Flexible Pipelines
(f) AS2032 Installation of PVC pipe systems
(g) AS3500 Plumbing and Drainage
(h) Department of Environment and Natural Resources, Planning Guidelines for Water Supply and Sewerage, March 2005
(j) Water Supply (Safety and Reliability) Act
(k) Plumbing and Drainage Act

D12.02 OBJECTIVE

1. All premises in the Sewerage Service Area are to be connected directly and separately to the sewerage network. 

2. The sewerage network is to transport sewage from domestic, commercial and industrial properties using gravity flow pipes and, where this is uneconomic, by pumping, to the treatment plant. The sewerage reticulation system shall be designed to minimise the number of pump stations.

3. The sewerage network is to provide a holistic solution to the greater community, through the efficient construction, operations and maintenance of the Sewerage Systems. This solution is achieved through the adherence to Master Plans.

4. Master Plans are required to reflect a holistic approach of achieving the Least life cycle costs for the relevant Council.

5. The Desired Standards of Service (DSS) are determined and displayed by each Local Government and/or Sewerage Service Provider (SSP). These Guidelines provide acceptable solutions to meet a range of DSS. Designs that do not comply with an acceptable solution shall require a functional design, be RPEQ certified, and supported by design references and calculations.
D12.03 DEFINITIONS AND MATERIALS

1. Sewerage Service Provider means the entity responsible for providing the sewerage services in accordance with the Water Supply (Safety & Reliability) Act. The following table outlines the Sewerage Service Provider for each local government area.

<table>
<thead>
<tr>
<th>Council</th>
<th>Sewerage Service Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Banana Shire Council</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Central Highlands Regional Council</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Gladstone Regional Council</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Livingstone Shire Council</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Maranoa Regional Council</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Fitzroy River Water</td>
</tr>
</tbody>
</table>

2. Trunk infrastructure is defined in the Sustainable Planning Act and involves a list of assets as identified by the Local Government. In general, trunk infrastructure is not determined by asset size, but function and limited access. The function of trunk infrastructure is to serve a catchment or zone that is significant to the function/service of the network. Also, trunk infrastructure is not non-trunk infrastructure. In practice, trunk infrastructure is the limited access, bulk catchment collection and treatment of sewage via: trunk gravity mains, zone pump stations, zone rising mains, treatments plants, effluent re-use, and effluent disposal.

3. Non-trunk infrastructure is defined in the Sustainable Planning Act and involves internal works and/or external works required for the safety and efficiency of the network. For sewerage networks, the efficiency of the network means to avoid duplication of assets by sizing assets for the service area by a network analysis. In practise, non-trunk infrastructure is: access property connections, reticulation gravity sewer mains, reticulation collector mains, local sub-catchment sewage pump stations and associated rising mains.

4. EP means Equivalent Person

5. ET means Equivalent Tenement

6. PVC* means pipe material of Polyvinyl Chloride (Unplasticised (uPVC), Modified (MPVC) and Oriented (OPVC)) and composites and PE* means pipe material of Polyethylene in accordance with CMDG Purchase Specifications listed in Appendix B. In general non-pressure pipe is SN8 stiffness.

7. DI means ductile and CI means cast iron pipes and fittings in accordance with the published purchase specification of the relevant Sewerage Service Provider. Default specifications CMDG Purchase Specifications listed in Appendix B. In general DICL pipe is to comply with AS2280, have a pressure rating of PN35 and fittings are to have a pressure rating of 1200 kPa working pressure. Refer to Table D12.03.2 for the cement lining type.
Table D12.03.2 Cement Lining Type

<table>
<thead>
<tr>
<th>Council</th>
<th>Cement Lining type for sewerage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Calcareous (Pentair - Hydroline CA or equivalent)</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Normal</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Calcareous (Pentair - Hydroline CA or equivalent)</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Normal</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Normal</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Normal</td>
</tr>
</tbody>
</table>

8. Pipe colour and/or sleeving colour shall be: cream or grey for raw sewage, lilac for treated effluent reuse.

9. Flanges are to be in accordance with the published purchase specification of the relevant Sewerage Service Provider. Default specifications CMDG Purchase Specifications listed in Appendix B. In general flanges are AS4087 PN16 unless required otherwise through pressure calculations and/or by the relevant Water Service Provider.

10. Covers and Frames for access chambers are to be in accordance with the published purchase specification of the relevant Sewerage Service Provider. Default specifications CMDG Purchase Specifications are listed in Appendix B. In general Cover and Frames are AS 3996 Class B for non-trafficable locations and Class D for trafficable locations.

11. External to a sewerage wet well, structural steelwork, ladders, brackets, covers etc shall be abrasive blast cleaned to AS1627 Class 3 and hot dip galvanised to AS1650. Within a wet well environment all components shall be 316 Stainless Steel with the exception of the covers to wet wells and valve pits which shall be aluminium to reduce lifting weight for maintenance personnel.

12. Precast sewerage access chambers components are to be in accordance with published purchase specification of the relevant Sewerage Service Provider. Default specifications CMDG Purchase Specifications listed in Appendix B. In general they shall comply with AS 4198.

13. Bolts in above ground uses shall be at least hot dipped galvanised in accordance with AS1214, and as acceptable in a Local Government, refer to Table D12.03.3.

Table D12.03.3 Galvanised Bolts in Above Ground Uses

<table>
<thead>
<tr>
<th>Council</th>
<th>Above Ground Galvanised Bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Approved</td>
</tr>
<tr>
<td>Central Highland Regional</td>
<td>Approved</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Not approved</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Approved</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Approved</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Approved</td>
</tr>
</tbody>
</table>

14. Bolts in below ground uses, bolts shall be grade 316 stainless steel with nuts and washers grade 316 stainless steel wrapped with an approved tape consisting of synthetic fibre open weave cloth impregnated with saturated hydro-carbons, such as “Denso” tape, applied in accordance with the manufacturer's written instructions.

15. All ductile iron pipes and cast/ductile iron fittings shall be wrapped, taped and sealed completely with polyethylene sleeving 0.25mm thick. Wrapping shall be carried out in accordance with the pipe manufacturer’s recommendations.
16. Pipe bedding material shall:
   
   i. Consist of hard durable inert grains of washed river, marine or dune sand or hard rock sand or a blend of these naturally occurring sand types;
   
   ii. Have a grading which complies with Table 11.03.02 and compaction as per Table 11.03.03;
   
   iii. Have resistivity greater than 1500 Ohm.cm$^2$ when tested in accordance with AS1289.4.4.1;
   
   iv. Have a pH in the range 5-9 when determined in accordance with AS 1289.4.3.1;
   
   v. Be free from noxious weeds as proclaimed by the relevant regulators; and
   
   vi. Be free from dangerous chemicals as proclaimed by the relevant regulators.

Table D12.03.04 Sand Grading

<table>
<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>Grade A</th>
<th>Grade B*</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>4.75</td>
<td>95-100</td>
<td>100</td>
</tr>
<tr>
<td>2.36</td>
<td>85-95</td>
<td>90-100</td>
</tr>
<tr>
<td>1.18</td>
<td>65-80</td>
<td>85-100</td>
</tr>
<tr>
<td>0.6</td>
<td>50-70</td>
<td>70-100</td>
</tr>
<tr>
<td>0.3</td>
<td>30-50</td>
<td>50-100</td>
</tr>
<tr>
<td>0.15</td>
<td>5-12</td>
<td>0-40</td>
</tr>
<tr>
<td>0.075</td>
<td>3-8</td>
<td>0-5</td>
</tr>
</tbody>
</table>

* Taken from Table G3 of AS/NZS 2566.2-2002

Table D12.03.05 Bedding Compaction

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Test Method</th>
<th>Minimum Value (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trafficable Areas</td>
</tr>
<tr>
<td></td>
<td>Embedment</td>
<td>Trench / embankment Fill</td>
</tr>
<tr>
<td>Cohesionless</td>
<td>Density Index*</td>
<td>70</td>
</tr>
<tr>
<td>Cohesive</td>
<td>Dry Density ratio or Hilf Density Ratio</td>
<td>95</td>
</tr>
</tbody>
</table>

* Graded gravels and sands having fines (silt and clays) greater than 5% shall have their compaction determined by the dry density ratio test method

17. Property Connection Junction is the junction ‘not at grade’ between the Sewer Main and the Property Connection Branch.

18. Property Connection Branch is the pipework between the Property Junction and the Property Point of Connection. This pipework will be an asset of the Sewerage Service Provider.
19. Property Point of Connection is the point where the private sanitary drainage connects to the Service Provider’s Sewerage Network. The IO (Inspection Opening) usually marks the Property Point of Connection.

**D12.04 HYDRAULIC DESIGN**

1. The hydraulic design capacity calculations shall be in accordance with AS2200 – Design Charts for water supply and sewerage.

2. Colebrook-White roughness coefficient typical is 1.6mm, the proportional velocity and discharge for a part-full pipe is typically 1.13 and 0.9 respectively. Refer AS2200 Chart 13.

3. Vacuum sewer systems are not approved within the scope of this Guideline.

4. Special Sewerage Arrangements, Designs and Low Pressure systems are not approved within the scope of this guideline. Refer to the relevant Sewerage Service Provider.

**D12.05 PLANNED SERVICE AREA**

1. The ultimate planned service area, staged service area, hydraulic capacity and component sizing shall be as approved by the relevant Sewerage Service Provider via a Sewerage Network Analysis. Software used by consultants for Sewer Reticulation Network Analysis must be compatible with that use by the relevant Council. A list of the software used by each of the participating Councils has been provided below.
Table D12.05.1 Sewer Reticulation Network Analysis Software

<table>
<thead>
<tr>
<th>Council</th>
<th>Software Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td></td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td></td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>SWMM5</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

Note: SWMM5 is freely available online via the USEPA.

2. Sewer mains shall be extended to the boundaries of the development site where the sewer main is intended to service existing and/or future development. An acceptable solution is for an access chamber to be provided at 1.5 from the boundary with a capped stub extending to the property boundary.

3. The depth of sewer mains shall be sufficient to allow current and planned service area and all allotments, to be serviced directly and separately. Refer to SSP approved Network Analysis.

4. Property Connection Junction Depth shall not exceed 3m unless otherwise specifically approved by the SSP.

5. Where the whole area of any allotment cannot be serviced by a gravity Point of Connection, a plan showing serviced area should be produced, and the Local Government or Sewerage Service Provider approval sought before proceeding. Building pad covenants shall be provided for the serviced area where it is less than the whole area of the allotment.

D12.06 DESIGN LOADING

1. The Average Dry Weather Flow (ADWF) is to be calculated using an allowance in litres/day/equivalent person as provided in Table D12.6.1. This figure includes allowance for dry weather infiltration/inflow.
Table D12.06.1  Design Average Dry Weather Flow (ADWF)

<table>
<thead>
<tr>
<th>Council</th>
<th>Design ADWF</th>
<th>EP/ET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>200 L/d/EP</td>
<td></td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>250 L/d/EP</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>250 L/d/EP</td>
<td>2.6</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>675 L/d/ET</td>
<td>2.7</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>200 L/d/EP</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>675 L/d/ET</td>
<td>2.7</td>
</tr>
</tbody>
</table>

2. The ADWF diurnal hourly flow pattern ratios are as per Figure D12.06.1 and Table D12.06.2.

Figure D12.06.1  ADWF Diurnal flow ratios

Table D12.06.2- Sewer Weekly Curves

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Business</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>100%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Mon</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Tues</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Wed</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Thurs</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Fri</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Sat</td>
<td>100%</td>
<td>20%</td>
<td>0%</td>
</tr>
</tbody>
</table>
### Table D12.06.3 Design Average Dry Weather Flow (ADWF)

<table>
<thead>
<tr>
<th>Time</th>
<th>Residential</th>
<th>Residential Weekend</th>
<th>Commercial</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>0.24</td>
<td>1.4</td>
<td>0.528</td>
<td>0</td>
</tr>
<tr>
<td>1:00</td>
<td>0.192</td>
<td>1.25</td>
<td>0.408</td>
<td>0</td>
</tr>
<tr>
<td>2:00</td>
<td>0.168</td>
<td>1.143</td>
<td>0.288</td>
<td>0</td>
</tr>
<tr>
<td>3:00</td>
<td>0.192</td>
<td>0.875</td>
<td>0.24</td>
<td>0</td>
</tr>
<tr>
<td>4:00</td>
<td>0.387</td>
<td>0.558</td>
<td>0.24</td>
<td>0</td>
</tr>
<tr>
<td>5:00</td>
<td>0.889</td>
<td>0.486</td>
<td>0.24</td>
<td>0</td>
</tr>
<tr>
<td>6:00</td>
<td>2.16</td>
<td>0.489</td>
<td>0.264</td>
<td>0</td>
</tr>
<tr>
<td>7:00</td>
<td>2.06</td>
<td>0.932</td>
<td>0.48</td>
<td>0</td>
</tr>
<tr>
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<td>1.629</td>
<td>1.381</td>
<td>0.888</td>
<td>0</td>
</tr>
<tr>
<td>9:00</td>
<td>1.356</td>
<td>1.659</td>
<td>1.32</td>
<td>2.112</td>
</tr>
<tr>
<td>10:00</td>
<td>1.163</td>
<td>1.72</td>
<td>1.632</td>
<td>3.792</td>
</tr>
<tr>
<td>11:00</td>
<td>1.005</td>
<td>1.592</td>
<td>1.68</td>
<td>3</td>
</tr>
<tr>
<td>12:00</td>
<td>0.885</td>
<td>1.525</td>
<td>1.776</td>
<td>3</td>
</tr>
<tr>
<td>13:00</td>
<td>0.855</td>
<td>1.404</td>
<td>1.92</td>
<td>3.168</td>
</tr>
<tr>
<td>14:00</td>
<td>0.89</td>
<td>1.24</td>
<td>1.872</td>
<td>2.808</td>
</tr>
<tr>
<td>15:00</td>
<td>0.977</td>
<td>1.155</td>
<td>1.8</td>
<td>2.4</td>
</tr>
<tr>
<td>16:00</td>
<td>1.182</td>
<td>1.041</td>
<td>1.656</td>
<td>1.8</td>
</tr>
<tr>
<td>17:00</td>
<td>1.479</td>
<td>0.947</td>
<td>1.44</td>
<td>1.104</td>
</tr>
<tr>
<td>18:00</td>
<td>1.787</td>
<td>0.879</td>
<td>1.152</td>
<td>0.408</td>
</tr>
<tr>
<td>19:00</td>
<td>1.479</td>
<td>0.88</td>
<td>1.008</td>
<td>0.408</td>
</tr>
<tr>
<td>20:00</td>
<td>1.153</td>
<td>0.895</td>
<td>0.936</td>
<td>0</td>
</tr>
<tr>
<td>21:00</td>
<td>0.864</td>
<td>0.972</td>
<td>0.84</td>
<td>0</td>
</tr>
<tr>
<td>22:00</td>
<td>0.624</td>
<td>1.038</td>
<td>0.768</td>
<td>0</td>
</tr>
<tr>
<td>23:00</td>
<td>0.384</td>
<td>1.188</td>
<td>0.624</td>
<td>0</td>
</tr>
</tbody>
</table>

3. The Peak Dry Weather Flow (PDWF) shall be 2.5 times ADWF.  

4. The Wet Weather Flow (WWF) shall be 5 times ADWF. The flow pattern is a constant flow for 24hrs.  

5. Screened overflow pits are required, for loadings greater than WWF (5ADWF) capacity, to prevent overflow into buildings and public health exposure locations. Refer to Risk Assessment and Compliance with Environmental Duty of Care responsibilities under environmental legislation.  

6. Design EP’s are calculated based on development type. Refer to the relevant local government Planning Scheme documents / Infrastructure Charges policies for the equivalent demands for each development type. In the absence of Local Government specific information, refer Appendix C for default equivalent demand values.
D12.07 Alignment, Clearances, Tenure & Easements

1. All sewerage works will require written evidence of appropriate tenure rights. In general, all properties associated with the sewerage works shall be required to be identified in any Operational Works application.

2. Written approval shall be obtained from the registered owners of each of the affected property(s) affected by sewer construction works, by the Developer and submitted to the Sewer Service Provider.

3. Sewer Mains shall preferably be located as stated in Table D12.07.1. Where sewer mains are located adjacent to roofwater drainage the alignment shall be 2.00m.

Table D12.07.1 Sewer Main Alignment

<table>
<thead>
<tr>
<th>Council</th>
<th>Preferred sewer location</th>
<th>Within Properties</th>
<th>Within Road Reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Alignment</td>
<td>Alignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Front &amp; Rear</td>
<td>from side</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boundaries</td>
<td>Boundaries</td>
</tr>
<tr>
<td>Banana Shire</td>
<td>within properties</td>
<td>1.5m</td>
<td>1.0m</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>within properties</td>
<td>2.0m</td>
<td>2.0m</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>road reserve</td>
<td>2.0m</td>
<td>2.0m</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>within properties</td>
<td>2.0m</td>
<td>2.0m</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>within properties</td>
<td>2.0m</td>
<td>2.0m</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>within properties</td>
<td>2.0m</td>
<td>2.0m</td>
</tr>
</tbody>
</table>

4. All sewerage infrastructure within private allotments shall be required to be covered by an easement as shown in Table D12.07.2 unless otherwise approved by the Sewerage Service Provider.

Table D12.07.2 Minimum Width of Easements Over Sewer Mains

<table>
<thead>
<tr>
<th>Council</th>
<th>Required Easement Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Minimum 4.0m, with the formula being twice the depth of the sewer line with the sewer line located centrally in the easement</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>4.0m</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>4.0m with the sewer main to be located within a central zone in the easement which is at least 1m from the edge of the easement.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>4.0m</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Minimum 4.0m, with the formula being depth of the sewer line minus 1.0m plus the offset from the property boundary</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Minimum 3.0m, with the formula being twice the depth of the sewer line with the sewer line located centrally in the easement</td>
</tr>
</tbody>
</table>

5. The easement shall be centrally located over the sewer main where possible.
6. Clearance from buildings (any protrusions) to be a minimum of 2m. Large tree species shall not be planted within 1m of a sewer main.

7. Where a pipeline crosses a main road, watercourse or involves features under the control of any Authority/Corporation, the affected work shall be carried out in accordance with the requirements of that Authority/Corporation. It shall be the Superintendent’s responsibility to obtain written approval from the Authority/Corporation to carry out the work as part of the Development approval.

8. Where sewer mains are to be located within and parallel with existing local road reserves, the designer shall check that the sewer mains do not conflict with other utility services and locate the sewer mains to the satisfaction of the Local Government road manager. Refer to CMDG-R-100 for sewer alignment in these instances. There may be a need for additional verge width and hence additional road reserve width where sewer mains are located in road reserves.

9. Where sewer mains are to be located within and parallel with existing dedicated Main Road Reserves, the designer shall locate the sewer mains to the specifications of the Main Roads manager in accordance with public utility plant. Refer to Clause 80 Transport Infrastructure Act.

10. All crossings of roads, watercourses, etc shall be designed to minimise the crossing length. The desirable alignment is perpendicular to the road or watercourse alignment.

11. For local deviations (around a single point eg service pole) only, the minimum horizontal and vertical clearance from parallel services shall be 300mm.

12. It shall be the Superintendent’s responsibility to identify the existence of utility services including “Dial Before You Dig” and/or contact with all Utility Service Providers. The location of existing utility services shall be confirmed by the Contractor by ‘Dial Before You Dig’ and/or contact the Utility Service Providers and by pot-holing prior to excavation.

D12.08 ACCESS CHAMBERS

1. Access Chamber locations (on gravity sewer mains) shall be at every change of direction, change of grade, sewer main junctions except where horizontal and vertical curves are permitted in accordance with Table D12.09.04. Where possible, access chambers should be located above Q100 flood level.

2. Circular Access Chamber Internal Diameters shall be in accordance with Table D12.08.1 Rectangular Access Chamber shall have a minimum 600mm dimension opening. For more than 3 connecting lines the Sewerage Service Provider may require a larger access chamber internal diameter than specified in Table D12.08.1.

3. Access Chamber maximum spacing shall be in accordance with Table D12.08.02 for the relevant Local Government.

**Table D12.08.01 Access Chamber Minimum Diameter**

<table>
<thead>
<tr>
<th>Sewer Size (mm)</th>
<th>Minimum chamber internal diameter (mm) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 – 300</td>
<td>1050</td>
</tr>
<tr>
<td>375 and larger</td>
<td>1500</td>
</tr>
</tbody>
</table>

* for up to 3 connecting lines
Table D12.08.02  Access Chamber Maximum Spacing

<table>
<thead>
<tr>
<th>Council</th>
<th>Sewer Mains 150 – 300 mm diameter Maximum Spacing (m)</th>
<th>Sewer Mains 375mm diameter and larger Maximum Spacing (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>90 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>90 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>120 m</td>
<td>120 m</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>120 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>90 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>90 m</td>
<td>150 m</td>
</tr>
</tbody>
</table>

Table D12.08.03  Approved use of maintenance shafts and Lampholes

<table>
<thead>
<tr>
<th>Council</th>
<th>Maintenance Shafts</th>
<th>Lampholes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Not Approved</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Approved*</td>
<td>Approved*</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Not Approved</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Approved*</td>
<td>Approved*</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Not Approved</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Not Approved</td>
<td>Approved*</td>
</tr>
</tbody>
</table>

* Subject to item 4 below

4. Where approved by the relevant Sewerage Service Provider in Table D12.08.3, Maintenance Shafts in accordance with AS4999 or AS4798, may be used for sewer mains to minimise the number of closely spaced Access Chambers required for change of direction/slope. Maintenance Shafts are NOT to replace access chambers required at gravity sewer main junctions or maximum spacing (refer Table D12.08.2).

5. Precast access chambers in accordance with AS4198, are preferred over cast in situ access chambers. Refer to CMDG Standard Purchase Specification and standard drawings CMDG-S-020, CMDG-S-021, and CMDG-S-022.

6. All gravity sewer mains shall have an Access Chamber located at the upper reach of the line, except where the last reach is less than 40m, these gravity sewer mains may be constructed with a lamphole access chamber or Maintenance Shaft (where approved by the relevant Sewerage Service Provider). Refer CMDG-S-026.

7. The minimum drop measurement across the Access Chamber base shall be in accordance with standard drawing CMDG-S-027.

8. Access Chamber bases incorporating changes of flow direction greater than 90 degrees are not permitted unless specific approval is given by the relevant Sewerage Service Provider.

9. Drop Inlets to Access Chambers are indicated in standard drawings CMDG-S-021 and CMDG-S-023. The maximum number of internal drop inlet pipes is as per drawing CMDG-S-021.
10. Access Chamber numbering shall be ascending, progressing upstream. Convention is manhole # / line #.

11. Step irons shall NOT be provided in Access Chambers.

12. Tolerances for lateral and vertical deviations from the design position of access chambers shall be in accordance with the tolerances for deviations of pipelines (refer Section D12.13 Laying and Jointing of Pipes). Longitudinal deviations (ie chainage) from that position shall not exceed 300mm.

13. Concrete work for all cast-in-situ access chambers shall comply with the CMDG Construction Guideline C271 MINOR CONCRETE WORKS, in relation to the supply and placement of concrete and steel reinforcement, formwork, tolerances, construction joints, curing and protection.

14. Cement used in Cast-In-Situ Access Chambers shall be Type SR to AS 3972.

15. Generally, precast access chambers shall be made up with components consisting of a fibreglass base section, concrete shaft sections of section lengths such as to minimise the number of joints required, a concrete cone section (or converter slab for shallow depths), cover and surround. Make-up Rings may be used between cone sections and surrounds to make up height differentials. Use of precast conical access chamber bases (Humes “Supabowl” or approved equivalent) are permitted in accordance with Table D12.08.4.

**Table D12.08.04 Use of Precast Conical access chamber bases**

<table>
<thead>
<tr>
<th>Council</th>
<th>Precast Conical access chamber bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Not approved</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Approved</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Not approved</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Approved</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Not approved</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Approved</td>
</tr>
</tbody>
</table>

16. The installation of all precast access chamber components shall be in accordance with the manufacturers' recommended procedures and requirements.

17. Backfill for all precast access chambers shall be placed and compacted evenly around the access chamber to a level 300mm above the top of the highest incoming pipe and for the full width of the excavation. If necessary, the Contractor shall import and compact non-cohesive granular material. Refer D12.12 Backfill and Compaction.

18. Covers and frames shall be in accordance with AS3996 and Appendix B CMDG Purchase Specification. The Unit Load Classification shall be either Class B within private property and no vehicle loadings or Class D for all vehicle loadings and all outside private property and all Maintenance Shafts.

19. Covers and Frames fastening (bolt down) are required as per the following Table D12.08.05.
Table D12.08.05 Use of Bolt Down Covers

<table>
<thead>
<tr>
<th>Council</th>
<th>Use of Bolt down covers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Required for Access Chambers below Q10 flood level, and below Highest Astronomical Tide (HAT) level</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Required for Access Chambers below Q10 flood level, and below Highest Astronomical Tide (HAT) level</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Not Approved. Access Chambers shall be located to have FSL 100mm above Q100 where possible.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Required for Access Chambers below Q10 flood level, and below Highest Astronomical Tide (HAT) level</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Required for Access Chambers below Q10 flood level, and below Highest Astronomical Tide (HAT) level</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Required for Access Chambers below Q10 flood level, and below Highest Astronomical Tide (HAT) level</td>
</tr>
</tbody>
</table>

20. Access Chamber covers shall be finished in accordance with Table D12.08.6.

Table D12.08.06 Access Chamber Finished Surface Level

<table>
<thead>
<tr>
<th>Location</th>
<th>Access Chamber Finished Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads, Footpaths</td>
<td>Flush with surface</td>
</tr>
<tr>
<td>Private Property</td>
<td>75mm above finished earthworks level</td>
</tr>
<tr>
<td>Floodways</td>
<td>As directed by Local Government</td>
</tr>
<tr>
<td>Elsewhere</td>
<td>Covers shall be finished minimum 50mm to a maximum 100mm above the surface of the ground, in a manner designed to avoid as far as possible, the entry of surface water</td>
</tr>
</tbody>
</table>

D12.09 SEWER MAINS

1. All gravity and rising sewer mains shall be in accordance with Table D12.09.01.

Table D12.09.01 Sewer Main Material Type

<table>
<thead>
<tr>
<th>Council</th>
<th>Gravity Mains – 150mm and 225mm</th>
<th>Gravity Mains 300mm and greater</th>
<th>Rising Mains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>PVC RRJ in 3m lengths</td>
<td>To be determined by Sewerage Service Provider</td>
<td>PVC Class PN 16 or DI PN35</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>PVC RRJ in 3m lengths</td>
<td>PVC Class PN 16 or DI PN35</td>
<td>PVC Class PN 16 or DI PN35</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>PVC RRJ in 3m lengths</td>
<td>Ductile Iron PN35 (Tyton Extreme or equiv)</td>
<td>PE 100</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>PVC RRJ in 3m lengths</td>
<td>To be determined by Sewerage Service Provider</td>
<td>PVC Class PN 16 or DI PN35</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>PVC RRJ in 3m lengths</td>
<td>PVC Class PN 16 or DI PN35</td>
<td>PVC Class PN 16 or DI PN35</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>PVC RRJ in 3m lengths</td>
<td>PVC Class PN 16 or DI PN35</td>
<td>PVC Class PN 16 or DI PN35</td>
</tr>
</tbody>
</table>
2. All PVC* gravity sewer mains shall be minimum Class SN8 with heavier classes applicable for deeper sewer mains in accordance with the manufacturers requirements. All PVC* sewer rising mains shall be in accordance with CMDG Standard Purchase Specifications. All ductile pipe shall be PN35 or greater. All Ductile Pipe and fittings shall be sleeved with polyethylene sleeving.

3. The minimum grade of gravity sewer mains shall be in accordance with Table D12.09.1.

<table>
<thead>
<tr>
<th>Table D12.09.02 Minimum Grades of Sewer Mains *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sewer Size (mm)</strong></td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>225</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>375</td>
</tr>
<tr>
<td>450</td>
</tr>
<tr>
<td>525</td>
</tr>
<tr>
<td>600</td>
</tr>
<tr>
<td>675</td>
</tr>
<tr>
<td>750</td>
</tr>
</tbody>
</table>

* Unless otherwise approved by the Sewerage Service Provider (in writing), the minimum grade of gravity sewers (larger than 225mm diameter) must ensure that a slime stripping velocity is achieved.

4. Unless otherwise specified on the drawings, the minimum depth of cover to be provided for gravity sewer mains and sewer rising mains shall be as listed in Table D12.09.2 (all depths from finished surface). Cover under roads to be measured from the adjacent kerb or edge of gravel or edge of pavement.

<table>
<thead>
<tr>
<th>Table D12.09.03 Minimum cover of Sewer Mains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCATION OF PIPE</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1. Areas not subject to vehicular loading:</td>
</tr>
<tr>
<td>2. Areas subject to vehicular loading:</td>
</tr>
<tr>
<td>a) not in roadway</td>
</tr>
<tr>
<td>b) in sealed roadway</td>
</tr>
<tr>
<td>c) in unsealed roadway</td>
</tr>
</tbody>
</table>

5. Pipeline installation in general is to be in accordance with AS2032, AS2033, AS2566.2 and AS3500 unless noted otherwise. Refer also to standard drawing CMDG-S-090.

6. Where pipelines are connected to large structures (e.g. sewage pump stations or 1500mm diameter Access Chambers) or where excessive differential movement might occur, then connection by means of 600mm long pipes and two flexible joints is required. The first joint being at or within 150mm of the face of the structure. Where flexible joints cannot be made with cut pipes, the Contractor shall select pipes from the various lengths provided in order to make the second joint within 300mm of the position shown on the drawings. Foam cores shall be provided for future connections.
7. The horizontal and vertical clearance to all other crossover underground services shall be 300mm desirable minimum and 100mm absolute minimum. The minimum horizontal and vertical clearances to all parallel underground services shall be 300mm desirable minimum and 100mm absolute minimum clearance provided the other services have marker tape and mechanical protection as defined by AS3500.

8. Where permitted in accordance with Table D12.09.4, long radius sweep bends are permitted for horizontal and vertical change of alignment of sewers subject to the following requirements:
   i. Maximum change of direction at each bend of 45 degrees;
   ii. Maximum of 2 bends between access chambers; and
   iii. Maximum access chamber spacings still apply.

Table D12.09.04 Use of Horizontal and Vertical sewer bends

<table>
<thead>
<tr>
<th>Council</th>
<th>Horizontal Sewer Bends</th>
<th>Vertical Sewer Bends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Not approved</td>
<td>Not approved</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Not approved</td>
<td>Not approved</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Approved</td>
<td>Not approved</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Approved</td>
<td>Approved</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Not approved</td>
<td>Not approved</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Not approved</td>
<td>Not approved</td>
</tr>
</tbody>
</table>

9. Sewer mains laid on grades greater than 1 in 6 shall be provided with concrete anchor blocks. Refer Standard Drawing CMDG-S-090. An anchor block is required behind each socket. The nominal size of the anchor block is to be shown on the drawings.

10. Use of inverted syphons is NOT permitted.

11. The depth of a reticulation sewer main is recommended to be a desirable maximum of 3.5m to invert of pipe.

12. The rising main shall be sized to allow free movement of the largest sphere diameter that can pass through the pump impeller. An acceptable solution for minimum rising main internal diameter shall be 100mm.

13. Scour valves shall be installed at significant low points in the sewer rising main in accordance with the relevant standard drawing. Air valves shall be installed at critical high points in the sewer rising main. Grading of the sewer rising main shall be carried out to minimise the number of air valves and scour valves. Refer to standard drawings CMDG-S-072, CMDG-S-073, CMDG-S-074.

14. Diameter of the sewer rising main to be selected to achieve:
   - Self-cleansing velocity of the main (the recommended minimum velocity for smaller pressure mains (<300mm) is 0.7m/s); and
   - The maximum velocity during WWF is some 1.5 m/sec.; and
   - Upper-limit of friction head. (typically a maximum pump head of 35m is regarded as acceptable.)
15. Discharge access chambers shall be in accordance with Table D12.09.5. The level of
the sewer rising main inlet into the Discharge Access Chamber shall be at the same level
as the outlet pipe to avoid turbulence. Discharge Access Chambers shall be installed with
an air vent unless otherwise approved by the Sewerage Service Provider. Refer to
standard drawings CMDG-S-070A.

Table D12.09.05 Discharge Access Chambers

<table>
<thead>
<tr>
<th>Local Government</th>
<th>Discharge Access Chamber Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Fabricated polyethylene type or approved equivalent with integral benching, bottom, top, access neck and pipe stubs; OR Concrete epoxy coated (Parchem or equivalent products)</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Concrete epoxy coated – Parchem or equivalent products</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Fabricated polyethylene type or approved equivalent with integral benching, bottom, top, access neck and pipe stubs; Concrete epoxy coated (Parchem or equivalent products) may be used for refurbishing existing concrete access chambers only.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Fabricated polyethylene type or approved equivalent with integral benching, bottom, top, access neck and pipe stubs; OR Concrete epoxy coated (Parchem or equivalent products)</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Fabricated polyethylene type or approved equivalent with integral benching, bottom, top, access neck and pipe stubs; OR Concrete epoxy coated (Parchem or equivalent products)</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Fabricated polyethylene type or approved equivalent with integral benching, bottom, top, access neck and pipe stubs; OR Concrete epoxy coated (Parchem or equivalent products)</td>
</tr>
</tbody>
</table>

D12.10 VENTING

1. Vents shall be installed, as required by the Sewerage Service Provider. Refer to
standard drawing CMDG-S-070A. Proprietary odour unit vents may be considered by the
Sewerage Service Provider.

2. A vent may be required to manage excessive odour discharge to atmosphere.
Typically this is most likely required at the bottom of a long steep line where a hydraulic
jump may occur in the flatter pipe section.

D12.11 TRENCHES & EXCAVATIONS

1. Trench width, depth, foundations, and stability are to be recorded as Notes on the
Operational Works Drawings.

2. Stabilised and compacted trench foundation is required in soft (typically less than
50kPa bearing capacity) or unstable or over-excavated ground conditions.

3. The Contractor shall leave a clear space of 600mm minimum between the edge of
any excavation and the inner toe of spoil banks. No excavated materials shall be
stacked against the walls of any structure or fence without the written permission of the
owner of such structure or fence. Topsoil from excavations shall be kept separate and
utilised to make good the surface after backfilling.

4. In the event of any trenching being left open for longer than one week, the Contractor
shall provide erosion control measures to ensure minimal soil disturbance and material
loss off the site. Some or all of these measures shall be provided immediately upon the
onset of rain with an open trench.
5. Control measures shall include:

(a) Provision of trench stops every 30 metres along a trench with provision for overtopping to be directed to the kerb.

(b) Placement of blue metal bags along kerb and gutter at maximum 30 metre spacings.

(c) Placement of blue metal bags around downstream drainage pits.

(d) Construction of diversion banks to divert the uphill catchment water from entering the trench.

6. The minimum clear width of trench (inside internal faces of timbering or sheet piling, if used) to a height of 150mm above the top of the pipe shall be 100mm each side the pipe, as shown in AS2566 or as specified by the Approved Operational Works drawings.

7. The maximum width of trench from the base of the trench to 150mm above the top of the pipe shall be the outside diameter of the pipe plus 600mm unless detailed otherwise on the Approved Operational Works drawings.

8. In waterlogged ground, de-watering shall be undertaken to reduce the water level below pipe level until sufficient backfill is placed to prevent pipe flotation.

9. For sites where ground level settlement is expected, a specialised design is required.

10. Where a trench is excavated across a paved surface, the width of the trench shall be kept to a minimum. Bitumen and concrete surfaces shall be carefully cut by saw cutting, or other approved means, so as to provide a neat straight line free from broken ragged edges.

11. For mains to be laid on rock foundation, excavation shall be carried out to a depth of not less than 100mm below the underside of the pipe barrel and socket or coupling.

12. For mains laid on other than rock, excavation shall be carried out to a depth of not less than 75mm below the underside of the pipe barrel and socket or coupling.

13. 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.

14. The safety of the general public shall be considered in the preparation of the site safety plan for the works. In urban areas, at completion of work each day, all trenches are to be backfilled. Where this requirement is unavoidable, safety fencing shall be installed along edges of open excavations to isolate them from the public. Where necessary, fenced walkways and vehicular crossways shall be provided across trenches to maintain access from carriageway to individual properties or within individual properties. All such installations shall be of adequate size and strength and satisfactorily illuminated.

**D12.13 LAYING AND JOINTING OFPIPES**

1. Before being laid, all pipes, fittings, valves, etc shall be cleaned and examined by the Contractor.
2. The Contractor shall provide and use approved drag scrapers or "detectors" to ensure that the interior of the pipeline is clean and free from obstructions. Approved plugs shall be used to prevent foreign matter entering sections of pipeline which are left uncompleted overnight.

3. Laying of pipelines shall commence at the lower end of the line and sockets shall face uphill.

4. The Contractor shall take all necessary precautions to prevent flotation of pipes during laying, backfilling and initial testing. Any temporary supports shall be removed prior to completion of backfilling.

5. Joints in pipelines shall be flexible rubber ring joints (either roll-on rubber ring or skid type) or mechanical joints (either fixed flange, gibault or bolted gland type). The joint type shall be as shown on the Drawings.

6. For pipes with rubber ring joints, spigots and sockets shall be clean and dry. When the joint is made, the witness mark shall at no point be more than 1mm from the end of the socket. After making the joint, a feeler gauge shall be used to check that the rubber ring has rolled in evenly, and if not, the pipe shall be withdrawn and the joint remade.

7. Only the lubricant specified by the pipe manufacturer and or fitting manufacturer shall be applied.

8. Pipes may be cut as needed to suit closing lengths, to remove damaged pipe or fittings or to remove sockets if necessary when jointing a socketed fitting.

9. For field cuts, only an approved mechanical pipe cutter shall be used. All field cuts shall achieve a 'square cut' finish.

10. Any pipes cut in the field shall have their ends prepared in accordance with the manufacturer's written instructions.

11. Where pipes are cut in the field, a witness mark shall be made on the pipe at the length specified by the manufacturer from the end of the pipe. Scoring of uPVC pipes shall not be permitted. Where spigots and sockets are not made by the same manufacturer, reference shall be made to the socket manufacturer for the correct marking depth.

12. Where PVC* pipes are to be joined to pipes of another material, the joints shall be made as follows:

(a) For jointing PVC* spigot to VC socket or PVC* socket to VC spigot, an approved PVC* adaptor shall be used. The joints in both instances shall be made using a ring conforming to AS1646.

(b) For jointing PVC* socket to ductile iron spigot, an approved adaptor coupling shall be used.

13. Gravity pipelines shall be constructed to the tolerances specified hereafter:

(a) The maximum horizontal deviations to either side from the design axis of a pipeline shall be 50mm for all sizes of pipes.

(b) For vertical deviations from the design grade of pipelines of any diameter and grade, the following alternative methods A and B apply. Refer to Table D12.13.01 for which alternatives apply to each local government:
Table D12.13.01 Vertical Construction Tolerances

<table>
<thead>
<tr>
<th>Council</th>
<th>Vertical Construction Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Alternative A</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Alternative B</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Alternative A</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

Alternative A

(i) Any one pipe in a length between two access chambers or a dead-end and an access chamber, shall be placed so as to have a fall from the higher to the lower access chamber or a fall from the dead-end to the access chamber.

(ii) No affected section shall be more than 6m long, only if it complies with the above restrictions and that there is an overall fall in the section of pipe.

(iii) The invert level shall not deviate from the design grade line by more than 10mm, and only if it complies with the above restrictions and that there is an overall fall in the section of pipe.

Alternative B

The invert level shall not deviate from the design grade line by more than 5mm as long as it achieves the minimum grade.

14. Flexibly jointed pipelines for rising mains with gradual changes in alignment or grade shall be laid with the joint being deflected after it has been made. Table D12.13.02 shows the allowable pipe deflection for each Sewerage Service Provider. The manufacturer's written recommendations in respect of maximum deflection for each joint shall be complied with provided that no joint shall be deflected to such an extent as to impair its effectiveness.

Table D12.13.02 Pipe Deflections

<table>
<thead>
<tr>
<th>Local Government</th>
<th>Allowable pipe deflection for rising mains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>100% of manufacturers recommendations</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>75% of manufacturers recommendations</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td></td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>100% of manufacturers recommendations</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

15. Deflection within a pipe length is not permitted.

16. In all locations other than urban road reserves with a constructed road, marker posts at changes of direction and at such chainages that the location of the main is marked at least once each 250 metres, shall be provided as shown on Standard Drawing CMDG-S-28.
D12.12 BACKFILL AND COMPACTION

1. Compacted (95 per cent of the standard maximum dry density of the bedding material in accordance with AS1289.5.7.1) underlay bedding sand for pipes and fittings shall be a minimum depth of 100mm.

2. Flooding of non-cohesive material shall be considered as an acceptable method of compacting bedding underlay material.

3. Compacted (95 per cent of the standard maximum dry density of the bedding material in accordance with AS1289.5.7.1) overlay bedding sand for pipes and fittings shall be a minimum depth of 150mm.

4. Material for the side support and bedding overlay of the pipe shall comply with the pipe bedding material. The material shall be compacted in layers of not more than 150mm to 95 per cent of the standard maximum dry density of the bedding material used when determined in accordance with AS1289.5.7.1.

5. Other than under roads, the remainder of the excavation shall be backfilled with excavated material. The backfill shall be compacted as specified in the drawings and specification. Flooding of cohesive material shall NOT be permitted as a means of compacting backfill under roads.

6. Under roads, backfill shall comprise of approved roadbase material, sand or stabilised sand. Refer CMDG-W-040 for trench backfill details.

7. Backfilling and compaction shall be carried out without damaging the pipe or its external coating or wrapping or producing any movement or deflection of the pipe.

D12.14 PROPERTY CONNECTION BRANCH & POINT OF CONNECTION

1. Property Connection Junctions, Property Connection Branch and Point of Connections shall be installed in accordance with Standard Drawing CMDG-S-030. Show the connection chainage on the design drawings.

2. Each Property Connection Junction chainage is to be measured from the centre of the downstream Access Chamber.

3. The invert level of the non-trunk sewer main at the Property Connection Junction chainage shall be sufficient to service any ground level on the allotment, and shall consider the probability of any adverse cut & fill ground level changes, at building stage. An acceptable solution is the calculation of the most adverse distance and fall combination using a 1:40 grade, less 0.5m for cover and special fittings.

4. Property Connection Junctions located at the depth of greater than 2.0m from finished surface level shall have a WSAA approved heavy duty reinforced fibreglass junction.

5. Property Connection Junction preferred location in a non-trunk sewer main shall be in accordance with Table D12.14.1.
Table D12.14.1 Property Connection Junction preferred location

<table>
<thead>
<tr>
<th>Council</th>
<th>Acceptable Solution for Property Connection Junction Location into non-trunk sewer main.</th>
<th>Property Connection Junction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Access Chamber where possible</td>
<td></td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Access Chamber where possible, can connect into a Lamphole</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Non trunk sewer main</td>
<td></td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>(a) Non-trunk Sewer Main; or (b) Lamphole and Access Chamber; (c) Not direct into any trunk sewer main.</td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Access Chamber where possible</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>(a) Non-trunk Sewer Main; or (b) Lamphole and Access Chamber; (c) Not direct into any trunk sewer main.</td>
<td></td>
</tr>
</tbody>
</table>

6. Property Connection Junction direct into a trunk sewer main may only be used with the site specific approval of the Sewerage Service Provider.

7. Property Connection Junctions are ‘Not At Grade Junctions’ as defined by AS3500. This means that the Connection Branch invert level is at the non-trunk sewer main obvert level or higher. Junction ‘at grade’ may only be used with the site specific approval of the Sewerage Service Provider.

8. Backfill around risers shall be sand compacted to the top of the socket or coupling on the highest branch off the riser, for the full width of trench and for a minimum distance of 500mm upstream and downstream of the riser.

9. Where a non-trunk sewer main lies within an adjoining allotment, the Property Connection Branch is to extend a distance of 1.5m into the allotment from the property boundary, to be serviced with a Property Point of Connection. For battle-axe allotments with the Property Point of Connection may be located within the access, then pre-laying of private sanitary drainage shall extend along the access to a point 1.5m within the main part of the allotment.

10. Property Connection Branch size shall be a minimum 100mm diameter for residential and 150mm diameter for commercial / industrial unless approved by the Sewerage Service Provider.

11. Property Point of Connection should generally be located at the lowest corner of the allotment 1.5m upstream of the allotment boundary (where provided direct to a non-trunk sewer main) or to an access chamber. The Property Point of Connection shall not be located closer than 1.0m to a roofwater line.

12. The desirable maximum Property Connection Branch length shall be 3.0m.

13. Property Point of Connection invert level is to be sloped higher than the Property Connection Junction invert level and shall be sufficient to service any ground level on the allotment, and should consider the probability of any adverse cut & fill ground level changes, at building stage. An acceptable solution is the calculation of the most adverse distance and fall combination using a 1:40 grade, less 0.5m for cover and special fittings.

14. Property Point of Connection shall be a finished with a cap on the Property Connection Branch at Operational Works construction stage. This will allow some level options for the plumbing stage connection of sanitary drainage. At plumbing stage an Inspection Opening shall be fitted by the plumber at the Point of Connection.
Table D12.14.2  Marking Location of Property Connection

<table>
<thead>
<tr>
<th>Location</th>
<th>Method of marking property connection location (pre site development detail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td><strong>Type 1</strong>: Star picket driven into the ground adjacent to the riser and finished 500mm above the surface of the surrounding ground and finished with a PVC safety cap. The star picket shall be connected to an underground identification tape.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td><strong>Type 1</strong>: Star picket driven into the ground adjacent to the riser and finished 500mm above the surface of the surrounding ground and finished with a PVC safety cap. The star picket shall be connected to an underground identification tape.</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td><strong>Type 1</strong>: Contractor to loop yellow marking tape around end of house connection branch during backfilling. 25mm diameter grey conduit (2m long) to be installed on top of the cap.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td><strong>Type 1</strong>: Star picket driven into the ground adjacent to the riser and finished 500mm above the surface of the surrounding ground and finished with a PVC safety cap. The star picket shall be connected to an underground identification tape.</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td><strong>Type 2</strong>: Property Service PVC capped riser is extended 1m above finished ground surface.</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td><strong>Type 1</strong>: Star picket driven into the ground adjacent to the riser and finished 500mm above the surface of the surrounding ground and finished with a PVC safety cap. The star picket shall be connected to an underground identification tape.</td>
</tr>
</tbody>
</table>

15. The position of each Property Service Point of Connection shall be clearly marked by the Contractor on completion of backfilling, the marking shall be as per Table D12.14.2 and standard drawing CMDG-S-030.

16. The identification tape shall be tied to the riser and held in a vertical position during backfilling. The top end of the tape shall be spiked by the identification star picket immediately upon completion of backfilling.

17. Water seals (boundary traps) are to be provided to property connections for odour control only if required by the Sewerage Service Provider.

18. Crossover sanitary drains (at an angle of greater than 45° to the easement axis) are permitted within an easement.

D12.15  ANCHOR BLOCKS

1. Concrete anchor blocks shall be installed where the main is installed at a grade of 1 in 6 or steeper. Concrete anchor blocks shall be provided on the pipe barrel behind the socket at each pipe joint and in accordance with CMDG Standard Drawing CMDG-W-040.

2. The Contractor shall provide thrust blocks to bear against undisturbed material normal to the direction of thrust resulting from internal pressures over a bearing area not less than that shown on Standard Drawing CMDG-W-041.

3. Concrete works shall comply with the CMDG Construction Guideline C271 - MINOR CONCRETE WORKS

4. The Contractor shall provide temporary anchorages adequate to restrain the pipe when under test.
D12.16 RESTORATION OF SURFACES

1. Pavements, lawns and other improved areas shall be cleaned and left in the same order as they were at the commencement of the works. Lawns shall be restored with turf cut and set aside from the original surface and/or with commercially available turf.

2. 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. Pavements shall be maintained with crushed metal, gravel or other suitable material allowing for consolidation and shall then be restored to a condition equivalent to that of the original pavement.

3. Immediately the backfilling of a trench excavated through a pavement has been completed, the pavement shall be temporarily restored. Where the trench crosses bitumen or concrete pavement, a pre-mixed asphaltic material shall be used for such temporary restoration. Temporary restoration shall be maintained by the Contractor until final restoration is carried out. Final restoration of the pavement shall be carried out to restore the pavement and its sub-base to no less than the original condition. Final restoration may include, if required, the removal of temporary restoration.

4. Backfill shall be placed sufficiently high to compensate for expected settlement and further backfilling shall be carried out or the original backfill trimmed at the end of the Defects Liability Period in order that the surface of the completed trench may then conform to the adjacent surface. Surplus material shall be removed and disposed of to areas arranged by the Contractor.

5. Where, within public or private property, the reasonable convenience of persons will require such, trenches to be levelled off at the time of backfilling. Any subsequent settlement shall be made good by the Contractor, as required by placing additional fill.

6. In locations where 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 in such a way as to minimise future erosion of the backfill and adjacent ground surfaces. The Contractor shall maintain the backfill and adjacent ground until the expiry of the Defects Liability Period.

7. Where approved by the relevant authority underboring 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. 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.

D12.17 INSPECTION

1. All pipes, fittings, access chambers and components are to be inspected by an authorised inspector or authorised CCTV method, as specified by the Sewerage Service Provider.
Table D12.17.1 Inspection requirements for completed sewer

<table>
<thead>
<tr>
<th></th>
<th>Method of inspection for completed sewer mains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Visual inspection</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>CCTV</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>CCTV</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Visual inspection / CCTV if required by Council</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Visual inspection</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Visual inspection / CCTV if required by Council</td>
</tr>
</tbody>
</table>

2. Inspections are to be in compliance with Operational Works Permit conditions or CMDG Works Inspections.

3. Inspection schedule, inspector contact, notifications, fees, and workplace safety procedures are to be recorded at the pre-start safety meeting for the works.

4. For CCTV, flushing of the system must be completed and the CCTV procedure must be completed when all other tests have been completed. A DVD of the CCTV footage is to be submitted to the Sewerage Service Provider as part of the certification of the pipe system.

5. CCTV Inspections are to be conducted in accordance with WSA-05, including inclination reports.

D12.18 TESTING GENERAL

1. All Sewer Mains and Access Chambers shall be subject to testing as soon as practicable after construction, backfilling, concrete curing, and cleaning.

2. Sewer Mains or Access Chambers failing any test shall be repaired and the test repeated. The process of testing, repair of defects and retesting shall continue until a satisfactory test is obtained. If an asset fails twice, the repair / replacement methodology is to be submitted to the Sewerage Service Provider for approval before the works are undertaken.

3. All lines shall be clear and free from soil, slurry, liquids and other foreign substances at the time of initial and acceptance testing.

4. The Contractor shall provide temporary thrust equipment resulting from internal test pressures at temporary caps.

D12.19 TESTING OF GRAVITY SEWER MAINS

1. All gravity sewer mains shall be tested with approved procedures for each Sewerage Service Provider and whether testing is to be carried out by a NATA accredited body are highlighted in Table D.12.19.01. Vacuum testing is only accepted for gravity sewer mains as per the following Table D12.19.01.
Table D12.19.01 Testing Requirements for Gravity Sewer

<table>
<thead>
<tr>
<th>Council</th>
<th>Low Pressure Air Testing of gravity Sewer Mains</th>
<th>Hydrostatic Testing of Gravity Sewer Mains</th>
<th>NATA Accreditation</th>
<th>Vacuum testing for Gravity sewer mains as per AS2566</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Approved</td>
<td>Approved</td>
<td>No</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Approved</td>
<td>Approved</td>
<td>No</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Approved</td>
<td>Not Approved</td>
<td>Yes</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Approved</td>
<td>Approved</td>
<td>Yes*</td>
<td>Approved</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Approved</td>
<td>Approved</td>
<td>No</td>
<td>Not Approved</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Approved</td>
<td>Approved</td>
<td>No</td>
<td>Not Approved</td>
</tr>
</tbody>
</table>

* provided the entire contributing network is tested.

2. The **low pressure air testing** procedure shall be as follows:

2.1. Each section of the sewer main to be air tested shall be plugged at each end, one plug containing an air hose (and isolating valve) connection. Care shall be taken to ensure that the force, due to pressure on the plug, is not taken by the pipe joint, but is taken by struts bearing on the plug.

2.2. An air hose from a compressor shall be connected, and the pressure raised as quickly as possible to 30 kPa.

2.3. The 30 kPa air pressure shall be held constant for a minimum of three (3) minutes, to stabilise temperatures. Before closing the isolating valve, the pressure shall be sufficiently raised above the 30 kPa pressure, so that when the isolating valve is fully closed, the test pressure in the sewer main is maintained at or just above this 30 kPa pressure.

2.4. When the isolating valve on the air supply is closed, then the elapsed time shall be measured for the sewer main test pressure to drop by 5kPa from the starting pressure.

2.5. If the elapsed time for the test pressure to drop by 5kPa, is less than 3 minutes, then test shall be deemed to have failed.

2.6. Repairs and retesting shall be carried out until the low pressure air test is passed.

3. The **hydrostatic testing** procedure shall be as follows:

3.1. Hydrostatic testing shall be in accordance with AS3500.2:2003 Section 13.2 except that the sewer main shall be subject to 3m minimum and 5m maximum head.

4. The test gauge shall be minimum 150mm face diameter, and shall be certified to be correct by an approved testing authority.

5. Tests on sewer mains shall be carried out with the Property Connections constructed so that the Property Connection Branches are tested at the same time as the sewer main, with all Inspection Openings sealed, and lines capped.
D12.20 TESTING OF ACCESS CHAMBERS

1. Each Access Chamber shall be tested. The test should be undertaken soon as practicable after the Access Chamber is constructed and the Access Chamber cover surround fitted. Table D12.20.01 outlines the normal methods of testing accepted by Sewerage Service Providers. Low pressure air test or vacuum testing in accordance with AS2566 may be agreed with the Sewerage Service Provider as an alternative.

Table D12.20.01 Testing of Access Chambers

<table>
<thead>
<tr>
<th>Council</th>
<th>Method of testing of Access Chambers</th>
<th>NATA Accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Hydrostatic testing in accordance with the procedure outlined below.</td>
<td>No</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Vacuum Testing in accordance with AS2566.</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Vacuum Testing in accordance with AS2566 OR Hydrostatic testing in accordance with the procedure outlined below.</td>
<td>Yes</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Hydrostatic testing in accordance with the procedure outlined below.</td>
<td>No</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Hydrostatic testing in accordance with the procedure outlined below.</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>Hydrostatic testing in accordance with the procedure outlined below.</td>
<td></td>
</tr>
</tbody>
</table>

**Hydrostatic Test**

2. The hydrostatic test shall be made by plugging all pipe openings in the walls and then by filling the Access Chamber with water to the lowest point on the top of the Access Chamber cover surround. The plugs shall be positioned in the pipes as near as practicable to the internal face of the Access Chamber.

3. The Access Chamber will be filled with water and then left for 24 hours allowing an adequate period for absorption.

4. The Access Chamber shall be refilled and the loss of water during the following 3 hours will be measured. The hydrostatic test on the Access Chamber will be considered satisfactory provided the level does not drop more than 30mm in the 3 hours.

5. The plug of the outlet shall be fitted with a suitable isolating valve for emptying the Access Chamber on satisfactory completion of the test.

6. Repairs and retesting shall be carried out until the hydrostatic test is passed.

**D12.21 TESTING OF SEWER RISING MAINS**

1. Sewer Rising Mains shall be water pressure tested to detect excessive leakage and defects in the pipeline, including joints, thrust blocks and anchor blocks. Compressed air or vacuum testing is not accepted for pressure sewer mains.

2. Pipelines shall be tested in sections as soon as practicable after each section has been laid, jointed, backfilled and cleaned, provided that the pressure testing shall not be commenced earlier than seven days after the last concrete thrust or anchor block in the section has been
3. For the purpose of this sub-clause, a section shall be defined as a length of pipeline which can be effectively isolated for testing, eg by means of isolating valves or caps. **Section Definition**

4. Water pressure testing shall not be carried out during wet weather unless otherwise approved by the Sewerage Service Provider. **Wet Weather**

5. During the water pressure testing of a pipeline, each isolating valve shall sustain at least once, the full test pressure on one side of the valve in closed position with no pressure on the other side for at least 15 minutes. **Isolation Valve Test**

6. The water pressure test procedures which apply to Sewerage Service Providers shall be as follows:

<table>
<thead>
<tr>
<th>Method of testing of Rising mains</th>
<th>NATA Accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>Water Pressure Testing in accordance with the procedure outlined in item 7 below.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>Water Pressure Testing as per WSA-07 (Poly) and WSA-04 (Other materials).</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>Water Pressure Testing in accordance with the procedure outlined in item 7 below.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>Water Pressure Testing as per WSA-07 (Poly) and WSA-04 (Other materials).</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>Water Pressure Testing in accordance with the procedure outlined in item 7 below.</td>
</tr>
</tbody>
</table>

7. **Water Pressure Testing Procedure**

7.1 The pipeline section shall be filled slowly with water, taking care that all air is expelled. Purging of air from rising mains shall be promoted by opening air valves. **Filling with water**

7.2 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 water pressure testing. **Absorption Period**

7.3 The maximum water test pressure which shall be applied to the lowest part of each section of the pipeline shall be 1250kPa. **Test Pressure**

7.4 The water test pressure shall be maintained as long as required, while the whole section is examined, and in any case not less than 15 minutes. **Duration of test**

7.5 The pressure testing of a section shall be considered to be satisfactory if:

(a) there is no failure of any thrust block, anchor block, pipe, fitting, valve, joint or any other pipeline component; and

(b) there is no visible leakage; and

(c) there is no loss of pressure in the 15 minute test period. **Results**

8. Any failure, defect, and/or visible leakage, which is detected during the pressure testing of the pipeline shall be repaired and retested.
9. Testing of Poly welds is to be in accordance with WSA-07 Clause 18.3

D12.22 CLEANING OF SEWERS

1. Before the sewers, manholes and property connections are accepted they shall be cleaned to remove all clay, sand and other materials.

2. All water plus materials used in the flushing of the reticulation system shall under no circumstances be discharged into existing sewers downstream of construction. All lines shall be inspected after flushing and will not be accepted until they present a clear barrel, free from any obstruction.

D12.23 DEFECTS / MAINTENANCE PERIOD

1. The satisfactory performance, repair and maintenance of all assets, infrastructure and its components, constructed, installed and/or purchased by the developer is the responsibility of the developer during the Defects Liability (Maintenance) Period. The relevant Council is responsible to approve the necessary rectification works, the cost of defect rectification works are the sole responsibility of the developer.

D12.24 CONNECTIONS TO EXISTING SEWERAGE NETWORK

1. The connection of all new sewer mains, access chambers or Property Connections to the existing sewerage network shall be made by the Sewerage Service Provider staff at the developers cost, unless otherwise approved by the Sewerage Service Provider.

PUMPING STATIONS

D12.25 PUMPING STATIONS GENERAL

1. Pump stations shall be designed in accordance with the following criteria and relevant Standard Drawings CMDG-S-061, CMDG-S-062, CMDG-S-063, CMDG-S-064

2. The following criteria are intended to further clarify and compliment Sewage Pumping Station Code of Australia WSA 04-2001. The Sewerage Service Provider should be consulted prior to design to determine specific requirements for pumps, electrical, switchboard, site security and telemetry. Arrangements for supply of electrical switchboard

3. Generally the Sewerage Service Provider will supply and install electrical and telemetry equipment for the Sewage Pump station at the developers cost. The Sewerage Service Provider should be consulted regarding their preferences and a quotation sought to provide these services if necessary.

D12.26 LOCATION

1. Pump station shall be located as far as possible away from existing or proposed habitable dwellings. Table D12.26.01 shows the minimum setbacks applicable.
Table D12.26.01 Minimum setback for Sewage Pump Stations

<table>
<thead>
<tr>
<th>Council</th>
<th>Minimum setback for Sewage Pump Stations from habitable dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>30m</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>50m – measured from edge of wet well to property boundary</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>30m</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

2. Pump stations shall be located on freehold land to be transferred to the Sewerage Service Provider.  

3. Driveway for the pump station shall be in the form of a sealed industrial access (concrete, asphalt, etc) and shall have a minimum sealed width of 3.0m.  

4. A turnaround area shall be provided for Sewerage Service Provider’s service vehicle with a minimum concrete hard stand area 4.0m x 3.0m adjacent to the pump well access lids.  

5. The top slab of the pump well shall be 150mm min above the finished ground level and the surrounding ground shall be shaped to fall away from the pump station.  

6. A 1.8m high chainmesh security fence shall be provided around the boundary, if directed by the Sewerage Service Provider.  

7. The top slab, switchboard and electrical pits must be located above Q100 flood level or storm surge level.  

8. Typical area of land required for the sewage pump station (excluding any access laneway) would be 20m x 20m for a dual well site. Smaller sites may be approved.  

9. The general arrangements for a sewage pump station are as follows in Table D12.21.02.

Table D12.26.02 Sewage Pump Station General Arrangements

<table>
<thead>
<tr>
<th>Council</th>
<th>Standard drawings showing Sewage Pump Station General Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>CMDG-S-58, and CMDG-S-61-64</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>GRC-STD-S-501</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>CMDG-S-58, and CMDG-S-61-64</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>
D12.27 DESIGN CRITERIA – PUMPS AND WET WELLS

1. The design pumping capacity and pump type is to be nominated by the Sewerage Service Provider for the planned loading, according to the planning horizon and staging plan. Typically the pump type is to be centrifugal and capable of passing a 75mm sphere.

2. Duty/standby pumping shall be provided in accordance with Table D12.27.01.

Table D12.27.01 Sewage Pump Duty

<table>
<thead>
<tr>
<th>Council</th>
<th>Sewage Pump Duty Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>2 pumps required. 1 pump operates at PDWF, and 2 pumps together operate at WWF.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>2 pumps required. Each pump sized to operate at WWF</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>2 pumps required. 1 pump operates at PDWF, and 2 pumps together operate at WWF.</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

* Typically if the duty point is chosen as the two pumps operating to meet the nominated WWF loading for 1.5m/sec, then this usually achieves the minimum scouring velocity of one pump (PDWF) operation.

3. Depending upon the characteristics of the catchment area, size of pump station and associated rising main, grinder pumps may be permitted, with the specific approval of the Sewerage Service Provider.

4. The minimum wet well internal diameter shall be 2400mm.

5. Wet wells shall not be provided with ladders unless specifically directed by the Sewerage Service Provider. If required, ladders shall be in accordance with AS1657. Retractable handgrip stanchions, refer AS1657 Fig 5.2 are preferred.

6. At full design loading, the detention time of the wet well and rising main should not be more than two hours during daytime (6:00am to 6:00pm) to reduce the generation of hydrogen sulphide. Detention time may be calculated using the formula “\( T = \frac{0.025Q_p + 0.218 L_d^2}{Q_a} \)” 

Where
- \( T \) = Detention Time (hours)
- \( Q_p \) = Pump Capacity (L/s)
- \( L \) = Pressure Main Length (m)
- \( d \) = Pressure Main diameter (m)
- \( Q_a \) = ADWF (L/s)
7. Pump Stop and Start Level may be calculated using the formula “V=900xQp / S” where:

- \( V \) = Volume between pump stop & start level (L)
- \( Q_p \) = pump capacity (L/s)
- \( S \) = allowable number of starts per hour

To reduce the septicity at wet well and pressure main recommended number of starts per hour is between 5 and 10 during the daytime. (Maximum 10 or 90% of manufacturers recommended number, whichever is lower.)

8. Valve pits shall be located in accordance with Table D12.27.02.

**Table D12.27.02 Valve Pit Location**

<table>
<thead>
<tr>
<th>Council</th>
<th>Valve Pit Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>External to the wet well, attached to the wet well structure to prevent differential movement.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>External to the wet well, separate to the pump well structure.</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>External to the wet well, attached to the wet well structure to prevent differential movement.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td></td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
</tr>
</tbody>
</table>

9. Wet wells shall have an internal corrosion resistant protective coating if required by the Sewerage Service Provider.

10. Provision of well washers is to be in accordance with Table D12.27.03.

**Table D12.27.03 Well washers**

<table>
<thead>
<tr>
<th>Council</th>
<th>Provision of Well Washers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td>An approved automatic wet well washer connected to potable supply via a backflow prevention device shall be provided.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>None Required.</td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>An approved automatic wet well washer connected to potable supply via a backflow prevention device shall be provided.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td>None Required.</td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>An approved automatic wet well washer connected to potable supply via a backflow prevention device shall be provided.</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td>None Required.</td>
</tr>
</tbody>
</table>

11. Pumps shall be mounted on stainless steel guides with a fixed discharge bend – free standing pumps are not permitted. Lifting chains shall be stainless steel.

12. Where septicity control is required by the Sewerage Service Provider, the preferred method is by dosing of proprietary sewage conditioning agents. Soda ash solution is a quick and effective sewage conditioning agent.

13. All incoming sewer mains shall flow into one inlet access chamber, which will then have ONE inlet line flowing into the pump station.

14. An inlet valve is required on the inlet pipe. The inlet valve is to be located internal to the wet well.
15. The typical maximum depth of the inlet pipe invert is some 3.5m.  

16. The typical floor level of the wet well is some 1.5m below the inlet pipe invert.

17. Each sewage pump station shall have a screened overflow pit in accordance with standard drawing CMDG-S-058. The overflow level shall be for inflows greater than the planning horizon WWF (5ADWF)

18. Vent poles or proprietary odour units must be provided.

19. The wet well must be designed to counteract buoyancy and supporting design calculations are to be provided.

20. Flow meters are required to be installed in the pumping station valve pit, and connected to Council's SCADA system. A second flow meter, may be required at the rising main discharge point depending on the outcomes of a risk assessment.

D12.28 EMERGENCY STORAGE / STANDBY GENERATOR

1. The standard emergency storage capacity of the pump station shall be in accordance with Table D12.28.01. Where the required storage cannot be met then additional on site emergency storage wells must be provided.

<table>
<thead>
<tr>
<th></th>
<th>Emergency Storage</th>
<th>Calculation method for Emergency Storage Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Shire</td>
<td></td>
<td>Volume of wet well plus upstream network capacity (pipes and access chambers) below overflow level.</td>
</tr>
<tr>
<td>Central Highlands Regional</td>
<td>4 hours Average Dry Weather Flow (4xADWF)</td>
<td></td>
</tr>
<tr>
<td>Gladstone Regional</td>
<td>4 hours Average Dry Weather Flow (4xADWF) plus 50% of immediate upstream pump stations emergency storage requirements</td>
<td>Volume of wet well or other immediate upstream emergency storage devices below overflow level. Upstream network capacity is excluded.</td>
</tr>
<tr>
<td>Livingstone Shire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maranoa Regional</td>
<td>4 hours Average Dry Weather Flow (4xADWF)</td>
<td>Volume of wet well plus upstream network capacity (pipes and access chambers) below overflow level.</td>
</tr>
<tr>
<td>Rockhampton Regional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* An absolute minimum of two hours Average Dry Weather Flow (2xADWF) emergency storage may be provided subject to completion of a satisfactory risk assessment and subject to provision of an on-site generator Secondary Power Supply

2. A risk assessment must be approved by the Sewerage Service Provider and must be cognisant of sensitive public and environmental health duty of care legislative responsibilities, quality of electricity supply and operational plant of the relevant Sewerage Service Provider. The risk assessment will address the need for on site generators.

3. Pump stations with larger flows (pump capacity is more than 50L/s) shall be provided with an on-site generator Secondary Power Supply, even if it complies with emergency storage capacity.
D12.29 POWER DESIGN

1. Each sewage pump station shall be designed for Primary and Secondary Power Supply. The Primary Power Supply shall be the Electricity Provider as nominated by the Sewerage Service Provider (RSSP). The Secondary Power Supply as nominated by the RSSP, typically either mobile generator or fixed on-site generator or a second independent supply from the Electricity Provider.

2. The nominated Secondary Power Supply shall be incorporated into the switchboard, conduits, service poles, etc, even if a Secondary Power Supply is not required at the particular stage.


D12.30 CONTROL AND TELEMETRY DESIGN

1. Each pump station shall be able to be connected to the Sewerage Service Provider’s telemetry monitoring system.


D12.31 WATER SERVICE & WATER METER & BACKFLOW PROTECTION

1. All sewage pumping stations shall have an adequate water supply for cleaning & washdown sprays purposes.

2. A metered water service shall be arranged with the Registered Water Service Provider. Refer to standard drawing CMDG-W-030.

3. The water service shall be protected from contamination due to backflow by the installation of a registered break tank or reduced pressure zone device in accordance with the Plumbing & Drainage Act and AS 3500.

4. All internal water plumbing is regulated under the Plumbing & Drainage Act and requires all necessary applications and fees for Compliance Permits and Certificates.

DOCUMENTATION

D12.32 SEWERAGE NETWORK

1. Master Plans / Network Analysis are required to be submitted and approved by the Sewerage Service Provider as part of any development application submission. These plans must show the proposed finished surface levels over the entire site, the location and pipe diameter of the proposed reticulation system, the location of any pump stations and rising mains required and the connection points to the existing reticulation network.

2. The proposed sewerage network design, including calculations shall be submitted to the Sewerage Service Provider, and if required to the Local Government for approval as part of the Operational Works application.
3. The Drawings shall show to scale:-

3.1 Plan: contours, alignment of sewer mains, sizing of sewer mains, access chambers, valves, pumping stations, existing and proposed allotment contours and boundaries, and services, Property Connection Junction chainage, access chamber numbering, sample thrust block size, compaction.

3.2 Longitudinal section drawing of each sewer main will display the existing and finished surface, size, class and grade of sewer mains and rising mains, access chamber location, access chamber size (diameter), invert level of the inlet and outlet of the access chamber, deflection angle of the outlet pipe, type of pipe and crossing services. Property Connection Junction chainage, Property Connection Branch type, Point of Connection invert level.

3.3 General arrangement of pumping stations with site plan; concrete outlines; number, make, model and details of pumps; inlet and outlet pipework details and levels; pump cut in; cut out and alarm levels; switchboard location; pumping station access details.

3.4 The operational works submission must be accompanied by design calculations relating to sewage pumping stations including:

- Buoyancy calculations;
- Wet well structural certification;
- Design flow calculations (including plan of identified catchment area);
- Pump selection including pump curve with proposed duty point and rising main characteristics;
- Emergency storage calculation;
- Design assumptions including wet well control volume, rising main detention time etc.

3.5 Include a drawing note at each connection ‘Connection to the existing network to be carried out by Sewerage Service Provider, at the developer’s costs’.

3.6 Drawing Notes shall include (but not be limited to): pipe class, pipe colour, connection to existing system and Dial Before You Dig.

4. Detail plans shall be drawn to a scale of 1:1000 and longitudinal sections to a horizontal scale of 1:100 and a vertical scale of 1:200 or as approved otherwise by the Sewerage Service Provider. Refer to standard drawing CMDG-S-010.

5. At the Pre-start Meeting and during construction, the Superintendent and Contractors must have up-to-date Approved Operational Works Drawings on-site plus a copy of the Operational Works Decision Notice and any attached conditions.

6. If any CMDG drawings are specifically referenced in the drawing package, a copy of the CMDG drawings shall be attached in the drawing package. It is the designers’ responsibility to check and obtain the most up to date copies of the standard drawings from the CMDG website at the time of submission.

CMDG Standard drawings (or part thereof) are not to be replicated in the submitted drawings. However, any deviations (slight or significant) from CMDG standards and drawings must be shown on the submitted drawings, RPEQ certified and Council approved prior to construction.
D12.33 PUMPING STATION

1. Prior to commencement of the manufacture of any pumps and control equipment, four (4) copies of the following shall be submitted to the required Sewerage Service Provider for review.

(a) Switch and Control gear Assemblies - Proposed fully dimensioned manufacturing details, general arrangement (showing internal/external details) and foundation/gland plate details.

(b) Common Control – Complete circuit diagram and description of operation.

(c) Schedule of Equipment - Completed as to the equipment to be provided.

(d) Other Engineering drawings as required to fully describe the proposed equipment.

2. Drawings shall be on -“A3” size. All symbols used shall conform to AS 1102 and all wires and terminals shall be numbered

3. Review, assessment or approval of the drawings by the Sewerage Service Provider shall not relieve the Developer of the responsibility of complying with this Specification.

D12.34 AS CONSTRUCTED DETAILS

1. As constructed data shall be submitted to Sewerage Service Provider showing the asset location and attributes of pipelines, access chambers and junctions, all pumping station details together with operating and maintenance manuals. Details shall include the size, type, levels, grade of pipelines, access chamber location, types and cover details, pump details, switchboard equipment details and station structural details.

2. Refer to the Capricorn Municipal Development Guidelines web site www.cmdg.com.au for further information on the applicable Local Government’s As Constructed data submission requirements. These will appear within the ‘As Constructed’ tab..
APPENDIX A

QUALITY CONTROL, INSPECTIONS AND TESTING

<table>
<thead>
<tr>
<th>Activity</th>
<th>Key Quality Verification Requirements</th>
<th>Maximum Lot Size</th>
<th>Minimum Test Frequency</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INSPECTIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravity Sewer Mains and Property Services</td>
<td>Prior to backfilling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewer Rising Mains</td>
<td>Prior to backfilling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thrust blocks</td>
<td>Prior to backfilling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access Chambers</td>
<td>Base and benching</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Sewage Pump Station | (a) Prior to placement of wet well floor concrete  
(b) valve pit starter bars  
(c) (If applicable) Pre-fabricated well installation | | | |
| On-Maintenance Liability Period | Prior to acceptance by Council | | | |
| Off-Maintenance Liability Period | After 12 months from On-Maintenance Notice and Prior to release by Council | | | |
| **MANDATORY TESTING** | | | | |
| Siting and Excavation | Geometry | 1 line/structure | 1 per line/structure | Survey |
| Gravity Sewer Mains and Property Services | (a) CCTV Inspection (If Applicable)  
(b) Compressed Air Testing | | | D12.19 |
| Access Chambers | Hydrostatic Testing or Vacuum Testing (Refer D12.20) | each access chamber | D12.20 |
| Sewer Rising Mains | Hydrostatic Pressure Testing | All | | |
| Sewage Pump Station | (a) Hydrostatic Testing  
(b) Practical Completion Commissioning Tests | each | | |
| Backfill and Compaction Sewer > 2m deep and road crossings | Compaction | Trafficable - 50m of sewer trench  
Non-trafficable – 100m of sewer trench  
Access Chambers or Maintenance shaft | 1 per 300mm of fill  
1 per 900mm of fill  
1 at 1m depth within 300mm of structure | AS1289.5.7.1 |
Sewer < 2m deep | Compaction | 1 contract | As directed by Local Government | AS1289.5.7.1

**AUDIT TESTING – IF ORDERED BY COUNCIL**

<table>
<thead>
<tr>
<th>Materials Supply</th>
<th>Material Quality - Supplier's documentary evidence and certification of:</th>
<th>1 contract</th>
<th>As directed by Local Government</th>
<th>AS1477</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- uPVC Pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Ductile Iron Pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Prestressed Concrete Pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Bedding          | Material Quality - Grading                                            | 1 contract | 1 per contract per source      | Q103   |

| Concrete Bedding | Refer C271 Minor Concrete Works                                      |            |                                |        |

| Laying and Jointing of Pipes, Access Chambers, Structures Geometry | 1 line | 1 per line | Survey |

| Thrust and Anchor Blocks | Refer C271 Minor Concrete Works                                      |            |                                |        |

| Concrete Encasement | Refer C271 Minor Concrete Works                                      |            |                                |        |

| Cast-in-situ Access Chambers Material Quality | Tri-Calcium Aluminate Content | 1 contract | 1 per contract per source | AS3972 |
|                                              | Fineness Index               | 1 contract | 1 per contract per source | AS3972 |
|                                              | Minimum Cement Content       | 1 contract | 1 per contract per source | AS3972 |
APPENDIX B

PURCHASE SPECIFICATIONS

Precast Sewerage Access Chamber Components
Cover & Frames for Access Chambers – Water Supply & Sewerage
Cast Iron Fittings for Pipelines
Battery Powered Electromagnetic Water Meters
Electromagnetic Water Meters
Ductile Iron Pressure Pipes
Polyethylene Pressure Pipe
PVC Pressure Pipe
PVC Gravity Sewer Pipe and Fittings
Domestic On-Site Sewage Pump Station
Polyethylene Sleeking for Pipes
Detectable Marker Tape for Pipelines
Tapping Bands for Pipelines
Air Valves for Water Supply Purposes
Brass Valves
Butterfly Valves for General Purposes
Cast Iron Gate Valves for General Purposes
Spring Hydrant Valves for Waterworks Purposes
Metal Seated Sluice Valves
Non-Return Valves – Swing Check & Tilting Disk
Resilient Seated Sluice Valves
Sewerage Vent Pole
Single Detector Check Valve
Maintenance Shafts for Sewer Mains
## APPENDIX C

### TYPICAL LOADINGS PER DEVELOPMENT TYPE

The EP’s per development type are to be in accordance with each Council’s Developer Contribution Policies. Where these policies do not provide sufficient information, the EP’s given in Table D12.C.01 can be used as a guide. Refer also to relevant Adopted Infrastructure Charges Resolution for the Local Government.

**Table D12.C.01  Design EP’s per development type**

<table>
<thead>
<tr>
<th>Unit</th>
<th>ET</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accommodation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential - detatched dwelling</td>
<td>lot</td>
<td>1</td>
</tr>
<tr>
<td>Residential - Apartment/Unit/duplex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>unit</td>
<td>0.5</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>unit</td>
<td>0.8</td>
</tr>
<tr>
<td>3+ Bedroom</td>
<td>unit</td>
<td>1</td>
</tr>
<tr>
<td>Caravan Park - Van Site</td>
<td>site</td>
<td>0.8</td>
</tr>
<tr>
<td>Caravan Park - Tent Site</td>
<td>site</td>
<td>0.3</td>
</tr>
<tr>
<td>Hostel Accomodation</td>
<td>bed</td>
<td>0.5</td>
</tr>
<tr>
<td>Motel</td>
<td>room</td>
<td>0.6</td>
</tr>
<tr>
<td>Aged Care Accomodation (full service nursing home)</td>
<td>bed</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Retirement Village</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>unit</td>
<td>0.6</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>unit</td>
<td>0.9</td>
</tr>
<tr>
<td>3 Bedroom</td>
<td>unit</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Care Centre</td>
<td>staff &amp; pupils</td>
<td>0.1</td>
</tr>
<tr>
<td>Education – Primary School</td>
<td>staff &amp; pupils</td>
<td>0.1</td>
</tr>
<tr>
<td>Education – Secondary School</td>
<td>staff &amp; pupils</td>
<td>0.2</td>
</tr>
<tr>
<td>Education – Tertiary Institution</td>
<td>staff &amp; pupils</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Business</td>
<td>ha</td>
<td>21.3</td>
</tr>
<tr>
<td>Commercial Premises</td>
<td>100 sqm GFA</td>
<td>0.8</td>
</tr>
<tr>
<td>Shop</td>
<td>100 sqm GFA</td>
<td>0.9</td>
</tr>
<tr>
<td>Fast Food Services</td>
<td>100 sqm GFA</td>
<td>3.5</td>
</tr>
<tr>
<td>Food Services</td>
<td>100 sqm GFA</td>
<td>2</td>
</tr>
<tr>
<td>Hotel</td>
<td>100 sqm GFA</td>
<td>1.2</td>
</tr>
<tr>
<td>Major Shopping Development</td>
<td>100 sqm GFA</td>
<td>0.7</td>
</tr>
<tr>
<td>Medical Centre</td>
<td>100 sqm GFA</td>
<td>0.7</td>
</tr>
<tr>
<td>Restaurant</td>
<td>100 sqm GFA</td>
<td>1.6</td>
</tr>
<tr>
<td>Service Station</td>
<td>100 sqm GFA</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Industry</td>
<td>ha</td>
<td>28.1</td>
</tr>
<tr>
<td>Light Industry</td>
<td>ha</td>
<td>28.1</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crematorium</td>
<td>100 sqm GFA</td>
<td>0.8</td>
</tr>
<tr>
<td>Hospital</td>
<td>bed</td>
<td>1.4</td>
</tr>
<tr>
<td>Place of Worship</td>
<td>100 sqm GFA</td>
<td>0.4</td>
</tr>
<tr>
<td>Public Building</td>
<td>100 sqm GFA</td>
<td>0.7</td>
</tr>
</tbody>
</table>
GLADSTONE REGIONAL COUNCIL

VOLUME 3 of 4

DRAWINGS AND INFORMATION

QUALITY ASSURED, SCHEDULE OF RATES CONTRACT
for the
GLADSTONE WASTEWATER TREATMENT PLANT RISING MAIN

PREPARED BY: COUNCIL’S ENGINEERING SERVICES SECTION
DATE: February 2017
1 DRAWINGS AND INFORMATION

1.1 FOR CONSTRUCTION DESIGN DRAWINGS: 16-047-

- 000 COVER SHEET, LOCALITY PLAN AND DRAWING INDEX
- 001 STANDARD NOTES
- 002 SETOUT PLAN
- 400 GENERAL LAYOUT PLAN
- 401 Plan and Longitudinal Section Sheet 1 of 3
- 402 Plan and Longitudinal Section Sheet 2 of 3
- 403 Plan and Longitudinal Section Sheet 3 of 3
- 404 RISING MAIN DETAILS
- 405 GENERAL DETAILS

1.2 SUPPLEMENTARY STANDARD DRAWINGS

- Capricornia municipal design guidelines (CMDG) drawings
  - CMDG-W-041 - Water Main Thrust Block Details
  - CMDG-S-073 - Scour Valves Construction Details
  - CMDG-S-090 - Sewer Construction, Pipeline Construction Types
  - CMDG-W-060(D) - Hydrants and Valve Installation
  - CMDG-W-061(C) - Hydrants and Valve Surface Boxes

- Water Services Association of Australia (WSAA) Drawings:
  - WAT-1209 - Trench Drainage: Bulkheads & Trenchstop
GLADSTONE REGIONAL COUNCIL
CALLEMONDAH
16-047 RISING MAIN NRG TO GWWTP
CONSTRUCTION ISSUE
Before you start... be safety smart.
**DETAIL A - 150Ø AC RISING MAIN CONNECTION**

**Scale 1:50**

**NOTE:**
1. TOP VIEW DETAILS BEFORE VALVE BOX DOES NOT SHOW.
2. TOP VIEW BOX IN 150Ø Pipe EXCHANGE POINT
   3. VALVE BOX IS NOT REQUIRED.

**PRECAST 1050 Ø MANHOLE**

**SYMBOLS:**
- Ø: Diameter
- FL: Flat Lap
- SO: Stub Lap
- MT: Min. Cover
- H: Half
- SP: Spigot

**MATERIALS LIST DETAIL A**

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<tr>
<td>5</td>
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**DETAIL F - CONNECTION TO DISTRIBUTION TOWER**

**MATERIALS LIST DETAIL F**

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**DETAIL D - SCOUR**

**SYMBOLS:**
- Ø: Diameter
- FL: Flat Lap
- SO: Stub Lap
- MT: Min. Cover
- H: Half
- SP: Spigot

**MATERIALS LIST DETAIL D**

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**DETAIL E - AIR VALVE**

**SYMBOLS:**
- Ø: Diameter
- FL: Flat Lap
- SO: Stub Lap
- MT: Min. Cover
- H: Half
- SP: Spigot

**MATERIALS LIST DETAIL E**

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GLADSTONE REGIONAL COUNCIL

RISING MAIN BOLLARD

FLOW METER PIT DETAIL

RISING MAIN INDICATOR POST

Scales As Shown

NOTE: Indicates signatures on original issue of drawing or latest revision of the drawing.

CONSTRUCTION

Scales As Shown

LEVEL DATUM:

AZIMUTH DATUM:

SURVEY REF:

COORDS:

SURVEYED

CHECKED

DESIGNED

DRAWN

APPROVED

VERIFIED

REVISION

SCALES

AMENDMENTS

DATE

CHECKED

REV

DESCRIPTION

NOTE * Indicates signatures on original issue of drawing or latest revision of the drawing.
1. All fittings shall be provided with thrust blocks formed against solid ground to transfer unbalanced forces from fitting to solid ground.


3. Nominal thrust area ‘N’ shall be effected by Class N25 concrete over full length of fitting, and extending in depth from the bottom of the trench to 65mm above the top of the fitting.

4. Minimum area of blocks for reducers shall be equal to the difference in corresponding area for dead ends of each end diameter of reducer.

5. Tabulated “minimum thrust area for anchorage” apply for test pressure of 1300 kPa. Areas shall be adjusted pro rata for other specified test pressures except that nominal thrust areas ‘N’ shall have to be re-calculated for test pressures over 1300 kPa.

6. Shape and dimensions of concrete blocks shown are diagrammatic only.

7. For vertical thrust acting downwards, the safe bearing loads of the various soils may be taken as twice those for horizontal thrusts.

8. Sluice valves Ø375 or larger shall be installed in valve pits.

9. When placing the concrete on a uPVC pipe, care shall be taken to avoid encasing the pipe.

10. Where uPVC rubber ring jointed pipes are used, the normal practice of anchoring of bends, tees, dead ends and reducers shall be followed.

11. When setting uPVC pipes in concrete a membrane of polythene, PVC or felt shall surround the pipe and fitting to permit pipe movement in the concrete.

12. Unless otherwise specified, concrete anchorages are required for all valves Ø200 and above. Thrust area shall be as for dead ends.

13. Reducers to have a minimum area for anchors equal to difference in corresponding area for dead ends of each diameter of reducer.

14. Minimum cover to pipe shall be 600mm.

15. All dimensions in millimetres.

16. All thrust blocks to be keyed in 50mm into natural or equivalent ground. Hold down bolts & straps, refer to plan & elevation. (size of straps to have PEDQ certification)

**APPLICABILITY TABLE**

<table>
<thead>
<tr>
<th>Council</th>
<th>BSC</th>
<th>CHRC</th>
<th>GRC</th>
<th>LSC</th>
<th>MRC</th>
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**MINIMUM THRUST AREA FOR ANCHORAGE IN SQUARE METRES WITH TEST PRESSURE 1,300 KPA**

<table>
<thead>
<tr>
<th>90° &amp; 60° HORIZ. BENDS</th>
<th>45° &amp; 30° HORIZ. BENDS</th>
<th>22 1/2° HORIZ. BENDS</th>
<th>11 1/4° HORIZ. BENDS</th>
<th>TEES &amp; DEAD ENDS</th>
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Notes:

1. All fittings shall be provided with thrust blocks formed against solid ground to transfer unbalanced forces from fitting to solid ground.


3. Nominal thrust area ‘N’ shall be effected by Class N25 concrete over full length of fitting, and extending in depth from the bottom of the trench to 65mm above the top of the fitting.

4. Minimum area of blocks for reducers shall be equal to the difference in corresponding area for dead ends of each end diameter of reducer.

5. Tabulated “minimum thrust area for anchorage” apply for test pressure of 1300 kPa. Areas shall be adjusted pro rata for other specified test pressures except that nominal thrust areas ‘N’ shall have to be re-calculated for test pressures over 1300 kPa.

6. Shape and dimensions of concrete blocks shown are diagrammatic only.

7. For vertical thrust acting downwards, the safe bearing loads of the various soils may be taken as twice those for horizontal thrusts.

8. Sluice valves Ø375 or larger shall be installed in valve pits.

9. When placing the concrete on a uPVC pipe, care shall be taken to avoid encasing the pipe completely. The maximum encasement shall be 120mm.

10. Where uPVC rubber ring jointed pipes are used, the normal practice of anchoring of bends, tees, dead ends and reducers shall be followed.

11. When setting uPVC pipes in concrete a membrane of polythene, PVC or felt shall surround the pipe and fitting to permit pipe movement in the concrete.

12. Unless otherwise specified, concrete anchorages are required for all valves Ø200 and above. Thrust area shall be as for dead ends.

13. Reducers to have a minimum area for anchors equal to difference in corresponding area for dead ends of each diameter of reducer.

14. Minimum cover to pipe shall be 600mm.

15. All dimensions in millimetres.

16. All thrust blocks to be keyed in 50mm into natural or equivalent ground.
**APPLICABILITY TABLE**

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<td>Yes</td>
<td>No</td>
<td>Yes</td>
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</table>

**NOTES:**
1. Dimension ‘X’ shall be 75mm for BARRIER KERB and 25mm for MOUNTABLE KERB.
2. This Drawing shall be read in conjunction with the relevant specification for Service Conduits. A BRASS or STAINLESS STEEL Service Conduit Marker is to be installed at all Conduits. Refer Detail.
4. Markers for Valves to be installed in kerb and channel at 90° to Valve location.

**MARKER PLATES**

1. Where no kerb and channel exist marker plate to be fastened to fence, pole or stake. Brass or Stainless Steel mortar disc to be adhered to kerb face, adjacent to valve, or valve or scour valve.
2. Marking of fire hydrants adjacent to roads (where kerb and channel exist) to use RRPM refer Standard drawing CMDG-W-62.
3. Marker plate letters and figures painted in black enamel on white enamel background except for fire hydrant markers, which a reflective yellow background. Class 1, shall be used. For Sewerage, background for Ship, Scour and Air Valves shall be red enamel.
4. Stake to be CCA treated hardwood. Upper section of stake shall be primed, undercoated and finished with polyurethane ‘Staining Yellow’ or similar colour.
5. Hydrants and valves to be coated with thermosetting epoxy powder to AS 3952 and AS 2536. All bronze components to AS 2937.516.
6. Refer project documentation for valve/hydrant surface box type, as per Standard Drawing CMDG-W-0001.
7. Service Authority may require valves pits on mains Ø450 or larger.
8. All gauging to AS 1850.
9. Reinforcing bars Grade 400 to AS 1300.
10. All dimensions in millimetres.

**VALVE SPINDLE FIXING DETAIL**

**VALVE SPINDLE**

**UNDERGROUND VALVE EXTENSION SPINDLE**

**SECTION A - A**

**SECTION B - B**

**MARGIN SET FOR VALVE**

**MARGIN SET FOR HYDRANT**

**NOTES:**

- Dimensions and spacing requirements shall be as detailed on the drawing and service details.
- Where kerb and channel exist, markers shall be installed at 90° to kerb and 45° to valved face.
- The drawing and service details shall be read in conjunction with the relevant specification for Service Spread.
- Refer to Figure 4.2 of Standard Drawing CMDG-W-62 for Service Spread installation details.
- Markers for Valves to be installed in kerb and channel at 90° to Valve location.
NOTES:
1. Mass of body = 37kg approx.
2. Mass of cover = 14kg approx.
3. Rounding of 5mm NW, RAD, at all corners.
4. Grey cast iron, grade ≥ T180 to AS 1830.
5. Alternative valve boxes may be adopted where approved by the Service Authority.
6. All dimensions in millimetres.

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Applicable DWG CMDG-W-061A

ELEVATION

SECTIONAL VIEW

PLAN

HYDRANT COVER

VALVE COVER

C1 SURFACE BOX - HYDRANT/VALVE

PLAN

POLYETHYLENE SURFACE BOX - HYDRANT/VALVE

FOR USE IN NON TRAFFIC AREAS ONLY

NOTES:
1. The lid is secured to the body by a galvanised chain with stainless steel nuts and bolts.
2. Boxes made from UV resistant, high impact, high density Polyethylene or heavy duty glass filled nylon.
3. Aluminium pins are attached to the underside of the lid for location purposes.
4. Tapered with stacking lugs make storage and carriage easier.
5. All dimensions in millimetres.
CONCRETE BULKHEAD DETAIL

TRENCH STOP DETAIL

TYPICAL ROAD CROSSING BULKHEAD

NOTES:
1. ALL DIMENSIONS IN MILLIMETERS.
2. CONSTRUCT BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
3. CONSTRUCT BULKHEAD ADJACENT TO KERBS AND OUTER SHOULDER OF SEALER ROADS.
4. BULKHEAD AT A RETAINING WALL TO BE UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
6. CONCRETE TO BE CLASS N25.
7. DO NOT FORM PIPES DURING PLACEMENT OF CONCRETE.
8. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
9. PROVIDE A CONTINUOUS DRAINAGE PATH THROUGH BULKHEADS AND TRENCH STOPS AROUND VALVE CHAMBERS.
10. PROVIDE DRAINAGE DRAINAGE TO BE IN ACCORDANCE WITH WAT-1209.
11. FOR SLOPES >2:1 CONTINUOUSLY ENGAGE THE PIPE TO PREVENT MOVEMENT AND TRANSFER OF GROUND WATER.
12. WRAP JOINTS TO PREVENT DAMAGE TO PIPES.

ADDITIONAL INFORMATION PROVIDED IN WAT-1200 SERIES COMMENTARY