



**CLUSTER**  
**Trading Services**

**UNIT**  
**Water and Sanitation**

**DEPARTMENT**  
**Water & Sanitation Engineering**

## **PROCUREMENT DOCUMENT** **INFRASTRUCTURE**

Documents are to be obtained, free of charge, in electronic format, from the [National Treasury's eTenders website](#) or the [eThekweni Municipality's website](#).

**Contract No: 31302-5W**

**Contract Title: Tongaat Water Treatment Works Functional Upgrade**

**Est. CIDB Grade/ Class: 8 CE**

### **CLARIFICATION MEETING AND QUERIES**

**Clarification Meeting: Compulsory Site Briefing Meeting**

**Meeting Location, Date, Time:** Tongaat Water Treatment Works Site, 9 Rupert Coleman Pl, oThongathi, 4400 on the 09/06/2025 at 11h00.  
**Co-ordinates:** 29°32'41.22"S, 31° 7'41.32"E

**Queries can be addressed to:** Terence Thumbaya  
**The Employer's Agent's:** Naidu Consulting/MSW JV  
**Representative:** Terence.Thumbaya@Naiduconsulting.com  
**Representative:** All emails queries to be sent to by 19 June 2025. Response to the queries will be uploaded by 26 June 2025.

### **TENDER SUBMISSION**

**Delivery Location:** The Tender Box in the foyer of the Municipal Building  
166 KE Masinga Road, Durban

**Closing Date/ Time:** Friday, 04 July 2025 at 11h00

**FACSIMILE, eMAIL, or POSTED TENDERS WILL NOT BE ACCEPTED**

**Issued by:**

**ETHEKWINI MUNICIPALITY**

**Deputy Head: Water & Sanitation Engineering**

**Date of Issue: 10/04/2023**

Document Version 01/03/2024

#### **FOR OFFICIAL USE ONLY**

<b>Tenderer Name:</b>		<b>VAT Registered: Yes No</b>
	<b>Price (excl)</b>	<b>VAT</b>
<b>Submitted: R</b>		<b>Price (incl)</b>
<b>Corrected: R</b>		

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**PART T1: TENDERING PROCEDURES****T1.1.1: TENDER NOTICE AND INVITATION TO TENDER**

Tenders are hereby invited for the works to the Tongaat Water Treatment Works Functional Upgrade to the existing Buildings, Structures, Chambers, Mechanical and Electrical Infrastructure; as well as Improvements to the unit treatment processes.

<b>Subject</b>	<b>Description</b>	<b>Tender Data Ref.</b>
<b>Employer</b>	The Employer is the eThekweni Municipality as represented by: Deputy Head: <b>Water &amp; Sanitation Engineering</b>	F.1.1.1
<b>Tender Documents</b>	Documents can only be obtained in electronic format, issued by the eThekweni Municipality. Documentation can be downloaded from the <b>National Treasury's eTenders website</b> or the <b>eThekweni Municipality's Website</b> . The <u>entire document</u> should be printed (on A4 paper) and suitably bound by the tenderer.	F.1.2
<b>Eligibility</b>	It is <u>estimated</u> that tenderers should have a CIDB contractor grading designation of <b>8 CE</b> (or higher). The CIDB provisions in relation to a Contractor's Potentially Emerging (PE) status <u>do not</u> apply.	F.2.1.1
<b>Clarification Meeting</b>	<b>Tongaat Water Treatment Works Site, 9 Rupert Coleman Pl, oThongathi, 4400 on the 09/06/2025 at 11h00.</b> <b>Co-ordinates: 29°32'41.22"S, 31° 7'41.32"E</b>	F.2.7
<b>Seek Clarification</b>	Queries relating to these documents are to be addressed to the Employer's Agent's Representative whose contact details are: <b>Terence Thumbaya</b> <b>Naidu Consulting/MSW JV</b> <b>Terence.Thumbaya@Naiduconsulting.com</b> <b>All emails queries to be sent to by 19 June 2025. Response to the queries will be uploaded by 26 June 2025.</b>	F.2.8
<b>Submitting a Tender Offer</b>	Tender offers shall be delivered to: <b>The Tender Box in the foyer of the Municipal Building</b> <b>166 KE Masinga Road, Durban</b>	F.2.13
<b>Closing Time</b>	Tender offers shall be delivered on or before <b>Friday, 04 July 2025</b> at or before <b>11h00</b> .	F.2.15
<b>Evaluation of Tender Offers</b>	<b>The 90/10</b> Price Preference Point System, as specified in the PPPFA Regulations 2022 will be applied in the evaluation of tenders. Refer to Clause F.3.11 of the Tender Data for the <b>Specific Goal(S)</b> for the awarding of Preference Points, and other related evaluation requirements.	F.3.11
<b>Requirements for sealing, addressing, delivery, opening and assessment of tenders are further stated in the Tender Data</b>		

## **PART T1: TENDERING PROCEDURES**

### **T1.2: TENDER DATA**

#### **T1.2.1 STANDARD CONDITIONS OF TENDER**

The conditions of tender are the Standard Conditions of Tender as contained in Annex F of the CIDB Standard for Uniformity in Construction Procurement (July 2015) as published in Government Gazette No 38960, Board Notice 136 of 2015 of 10 July 2015.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

#### **T1.2.2 TENDER DATA**

Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

<b>F.1: GENERAL</b>
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**F.1.1 The employer:** The Employer for this Contract is the eThekweni Municipality as represented by: Deputy Head: **Water & Sanitation Engineering**

**F.1.2 Tender documents:** The Tender Documents issued by the Employer comprise:

- 1) This procurement document.
- 2) "General Conditions of Contract for Construction Works – 3<sup>rd</sup> Edition 2015" issued by the South African Institution of Civil Engineering (GCC 2015). This document is obtainable separately, and Tenderers shall obtain their own copies.
- 3) Particular Specifications specific to the works.
- 4) Drawings, issued separately from this document, or bound in Section C3.5 (as an Annexure).
- 5) In addition, Tenderers are advised, in their own interest, to obtain their own copies of the following acts, regulations, and standards referred to in this document as they are essential for the Tenderer to get acquainted with the basics of construction management, the implementation of preferential construction procurement policies, and the participation of targeted enterprise and labour.
  - The Employer's current (as at advertising date) Supply Chain Management Policy.
  - The Preferential Procurement Policy Framework Act No 5 of 2000, and the Preferential Procurement Policy Framework Act Regulations (2022).
  - The Occupational Health and Safety Act No 85 and Amendment Act No 181 of 1993, and the Construction Regulations (2014).
  - The Construction Industry Development Board Act No 38 of 2000 and the Regulations issued in terms of the Act (July 2013).
  - SANS 1921:2004 – Construction and Management Requirements for Works Contract, Parts 1-3.
  - Any other eThekweni Policy documents referenced in the Tender Documents.

Electronically downloaded documentation is obtainable from the National Treasury's **eTenders**



**Website** or the **eThekweni Municipality's Website** at URLs:

- <https://www.etenders.gov.za/>
- <https://www.durban.gov.za/pages/business/procurement>

The entire downloaded document should be printed on white A4 paper (single-sided) and suitably bound by the tenderer.

**F.1.4 Communication and employer's agent:** The Employer's Agent is:

Name: [Naidu Consulting](#)  
 Tel: [031 265 6007](#)  
 eMail: [Terence.Thumbaya@Naiduconsulting.com](mailto:Terence.Thumbaya@Naiduconsulting.com)

The Employer's Agent's Representative is:

[Terence Thumbaya](#)

[Naidu Consulting/MSW JV](#)

[Terence.Thumbaya@Naiduconsulting.com](mailto:Terence.Thumbaya@Naiduconsulting.com)

[All emails queries to be sent to by 19 June 2025. Response to the queries will be uploaded by 26 June 2025.](#)

The Tenderer's contact details, as indicated in the Contract Data: Clause C1.2.2.2 "Data to Be Provided by Contractor", shall be deemed as the only valid contact details for the Tenderer for use in communications between the Employer's Agent and the Tenderer.

## F.2: TENDERER'S OBLIGATIONS

**F.2.1.1 Eligibility: General**

A Tenderer **will not** be eligible to submit a tender if:

- (a) the Tenderer does not comply with the legal requirements as stated in the Employer's current SCM Policy.
- (b) the Tenderer cannot provide proof that he is in good standing with respect to duties, taxes, levies and contributions required in terms of legislation applicable to the work in the contract.
- (c) In the event of a Compulsory Clarification Meeting:
  - i) the Tenderer fails to attend the Compulsory Clarification Meeting.
  - ii) the Tenderer fails to have form "Certificate of Attendance at Clarification Meeting / Site Inspection" (in T2.2) signed by the Employer's Agent or his representative.
- (d) in the case of JV submissions, two or more JV entities have common directors / shareholders or common entities tendering for the same works.
- (e) at the time of closing of tenders, the Tenderer is not registered on the National Treasury Central Supplier Database (CSD) as a service provider. In the case of a Joint Venture, this requirement will apply individually to each party in the Joint Venture.
- (f) The tenderer has not submitted, with this tender, a valid Letter of Good Standing from the Compensation Commissioner as proof of being registered and in good standing with the compensation fund. Reference is to be made to Returnable Document T2.2.13.
- (g) The tender fails to complete and sign the Declaration of Municipal Fees in T2.2: "Returnable Documents" and submits the required documentation. Reference is to be made to Returnable

## Document T2.2.12.

SCM Policy (Cl.14(4)) requires suppliers/ service providers/ contractors to be registered on the eThekweni Municipality Central Supplier Database or be in a position to be so before the award.

In the event of the Tenderer not being registered on the eThekweni Municipality's Central Supplier Database, the tenderer must register on the internet at [www.durban.gov.za](http://www.durban.gov.za) by following these links:

- Business
- Supply Chain Management (SCM)
- Accredited Supplier and Contractor's Database.

The following are to be noted:

- (a) The information for registration as in the possession of the eThekweni Municipality will apply.
- (b) It is the Tenderer's responsibility to ensure that the details as submitted to the Municipality are correct.
- (c) Tenderers are to register prior to the submission of tenders.

#### F.2.1.2 Eligibility: CIDB

Only those tenderers who are registered (as "Active") with the CIDB (at time of tender closing), in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, for a **CE** class of construction work, are eligible to have their tenders evaluated.

Joint ventures are eligible to submit tenders provided that:

- (a) Every member of the joint venture is registered (as "Active") with the CIDB (at time of tender closing),
- (b) The lead partner has a contractor grading designation in the **CE** class of construction work and has a grading designation of not lower than one level below the required grading designation, and
- (c) The combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations (2013) is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a **CE** class of construction work or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations.

It should be noted that this contract is not part of a Targeted Development Programme (TDP). The CIDB provisions in relation to a Contractor's Potentially Emerging (PE) status do not apply.

#### F.2.2.2 The cost of the tender documents: Replace this paragraph with the following:

"Documents are to be obtained, free of charge, in electronic format, from the **National Treasury's eTenders website** or the **eThekweni Municipality's Website**. The entire electronically downloaded document should be printed on white A4 paper (single-sided) and suitably bound by the tenderer.

#### F.2.6 Acknowledge addenda: Add the following paragraphs to the clause:

"Addenda will be published, in electronic format, on the websites specified in F.1.2. Tenderers are to ensure that the eTenders website is consulted for any published addenda pertaining to this tender up to three days before the tender closing time as stated in the Tender Data."

"Acknowledgement of receipt of the addenda will be by the return of the relevant completed, dated, and signed portion of the addenda, to the physical or email address as specified on the addenda. Failure of the tenderer to comply with the requirements of the addenda may result in the tender submission being made non-responsive."

- F.2.7 Clarification meeting:**  
**Tongaat Water Treatment Works Site, 9 Rupert Coleman Pl, oThongathi, 4400 on the 09/06/2025 at 11h00.**  
**Co-ordinates: 29°32'41.22"S, 31° 7'41.32"E**

In the event of a Compulsory Clarification Meeting, Tenderers must sign the attendance register in the name of the tendering entity. The Tenderer's representative(s) at the clarification meeting must be able to clearly convey the discussions at the meeting to the person(s) responsible for compiling the entity's tender offer.

- F.2.12 Alternative tender offers:** No alternative tender offers will be considered.

- F.2.13 Submitting a tender offer:** Submissions must be submitted on official submission documentation issued (either in hard copy or in electronic format) by the eThekweni Municipality.

Identification details to be shown on each tender offer package are:

- Contract No. : **31302-5W**
- Contract Title : **Tongaat Water Treatment Works Functional Upgrade**

The Employer's address for delivery of tender offers is:

**The Tender Box in the foyer of the Municipal Building  
 166 KE Masinga Road, Durban**

**Bidders are required to also make an** electronic submission via SSS. Bidders must ensure that the hard copy and electronic submission are the same, failing which the submission will be deemed invalid. Bidders are responsible for resolving all access rights and submission queries before the tender closing date.

**SSS Queries Contact: Lindo Dlamini:** Tel: 031-3227133/031-3227153 email: [supplier.selfservice@durban.gov.za](mailto:supplier.selfservice@durban.gov.za)

Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.

- F.2.15 Closing time:** The closing time for delivery of tender offers is:

- Date : **Friday, 04 July 2025**
- Time : **11h00**

- F.2.16 Tender offer validity:** The Tender Offer validity period is 120 Days from the closing date for submission of tenders.

- F.2.23 Certificates:** Refer to **T2.1** for a listing of certificates that must be provided with the tender. All certificates must be valid at the time of tender closing.

**Tenderers are to include, at the back of their tender submission document, a printout of the required documents/ certificates.**

The Form of Offer (C1.1.1), Data to be provided by the Contractor (C1.2.2.2), and the Bill of Quantities (C2.2) are also required to be completed in full.

#### **Tax Clearance**

Reference is also to be made to returnable form T2.2.3: "Tax Compliance Status PIN/ Tax Clearance Certificate".

SARS has introduced a new Tax Compliance Status System. Tenderers must submit a **Tax Compliance Status PIN** (TCS PIN) instead of an original Tax Clearance Certificate. This TCS PIN can be used by third parties to certify the taxpayer's real-time compliance status. This TCS PIN is to be entered on Returnable Document T2.2.1: "Compulsory Enterprise Questionnaire". Separate Tax Clearance Certificates / TCS PINs are required for each entity in a Joint Venture.

Failure to comply will make the tender non-responsive.

#### **Compensation Commissioner**

Reference is also to be made to returnable form T2.2.13: "Eligibility: Registration with Compensation Commissioner".

The tenderer is to supply proof of being registered and in good standing with the compensation fund by submitting a valid **Letter of Good Standing** from the Compensation Commissioner.

Failure to comply will make the tender non-responsive.

#### **Central Supplier Database (CSD)**

Reference is also to be made to returnable form T2.2.14: "Eligibility: CSD Registration Report".

The entities (full) **CSD Registration Report**, obtained from the National Treasury Central Supplier Database, is to be included in the tender submission ( <https://secure.csd.gov.za> ).

Separate CSD Registration Reports are required for each entity in a Joint Venture.

#### **CIDB Registration**

Reference is also to be made to returnable form T2.2.15: "Eligibility: Verification of CIDB Registration and Status".

Registration with the CIDB must be reflected as "Active" at time of tender closing.

Tenderers are to include with their submission a printout of their **CIDB Registration**, obtained from the CIDB website ( <https://registers.cidb.org.za/PublicContractors/ContractorSearch> ).

The Joint Venture Grading Designation Calculator should be used when submitting as a Joint Venture ( <https://registers.cidb.org.za/PublicContractors/JVGradingDesignationCalc> ).

The date of obtaining the CIDB printout(s) is to be indicated on the printout.

### F.3: THE EMPLOYER'S UNDERTAKINGS

- F.3.1.1 Respond to requests from the tenderer:** Replace the words “five working days” with “three working days”.
- F.3.2 Issue addenda:** Add the following paragraph: “Addenda will be published, in electronic format, on the same platform(s) as the Tender Notification (refer to F.1.2).”
- F.3.4 Opening of Tender Submissions:** Tenders will be opened immediately after the closing time for tenders. The public reading of tenders will take place in the SCM Boardroom, 6<sup>th</sup> Floor, Engineering Unit Building, 166 KE Masinga Road, Durban.
- F.3.11 Evaluation of Tender Offers:**

#### Eligibility

Tenders will be checked for compliance with the ELIGIBILITY requirements, as specified in T1.2.2 Clause F.2.1. Tenderers not in compliance will be deemed non-responsive.

#### Functionality

FUNCTIONALITY will be evaluated to determine the responsiveness of tenders received. The minimum score for FUNCTIONALITY is 70 points. Those tenders not achieving the minimum score will be deemed non-responsive.

The functionality Criteria, Sub-Criteria, Points per Criteria/ Sub-Criteria, Returnable Documentation and Schedules, Method of Evaluation, and Prompts for Judgement are as specified in T1.2.3: “Additional Conditions of Tender”.

#### Preference Point System

The procedure for the evaluation of responsive tenders is **PRICE AND PREFERENCE** in accordance with the Employer’s current SCM Policy, the Preferential Procurement Policy Framework Act (5 of 2000), and the Preferential Procurement Policy Framework Act Regulations (2022).

#### Price Points

The **90/10** preference points system will be applied. The Formula used to calculate the **Price Points (max. 90)** will be according to that specified Regulation 5.1.

#### Preference Points

Reference is also to be made to T2.2.7: “MBD 6.1: Preference Points Claim”.

The Preference Points (either 20 or 10) will be derived from points allocated/ claimed for **Specific Goals** as indicated in the table(s) below, according to the specified **Goal/ Category Weightings**.

- **Ownership Goal**

Goal Weighting: 70%

The tendering entity's **Percentage Ownership**, in terms of the **Ownership Category(s)** listed below, is to be used in the determination of the tenderer's claim for **Preference Points**.

Ownership Categories	Criteria	80/20	90/10
Race: Black (w1)	Equals 0%	0	0
	Between 0% and 51%	5.6	2.8
	Greater or equal to 51% and less than 100%	11.2	5.6
	Equals 100%	14	7
Maximum Goal Points:		14	7

The **Weightings** of the **Ownership Categories** will be:

- w1 = 100%

**Proof of claim as declared on MBD 6.1** (1 or more of the following will be used in verifying the tenderer's status)

- Companies and Intellectual Property Commission registration document (CIPC)
- CSD report.
- B-BBEE Certificate of the tendering entity.
- Consolidated BBEE Certificate if the tendering entity is a Consortium, Joint Venture, or Trust (Issued by verification agency accredited by the South African Accreditation System).
- Agreement for a Consortium, Joint Venture, or Trust.

- **RDP Goal: The promotion of enterprises located in a specific municipal area**

Goal Weighting: 30%

The tendering entity's **Address** (as stated on the National Treasury Central Supplier Database (CSD) or on the eThekweni Municipality Vendor Portal) is to be used in the determination of the tenderer's claim for **Preference Points** for this Specific Goal. The **regions** and **zones** (or wards) within the eThekweni Municipality are as specified on the Part C4: "Site Information" of this procurement document.

Municipal Area	80/20	90/10
Not within eThekweni Municipality	0	0
Within eThekweni Municipality	2.4	1.2
Within the specified region / Adjoining Wards	4.8	2.4
Within the specified zone / Project Ward(s)	6	3
Maximum Goal Points:	6	3

**Proof of claim as declared on MBD 6.1** (1 or more of the following will be used in verifying the tenderer's status)

- CSD Report

**F.3.13 Acceptance of tender offer:** In addition to the requirements of Clause F.3.13 of the Standard Conditions of Tender, tender offers will only be accepted if:

- The tenderer submits a **valid Tax Clearance Certificate OR Tax Compliance Status PIN**, issued by the TCS System of the South African Revenue Services, or has made arrangements to meet outstanding tax obligations.
- The tenderer is **registered, and "Active", with the Construction Industry Development Board**, at time of tender closing, in an appropriate contractor grading designation.
- The tenderer or any of its directors/shareholders is **not listed on the Register of Tender Defaulters** in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a

- person prohibited from doing business with the public sector.
- (d) The tenderer has not:
    - Abused the Employer's Supply Chain Management System; or
    - Failed to perform on any previous contract and has been given a written notice to this effect.
  - (e) The tenderer has completed the **Compulsory Enterprise Questionnaire** and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process.
  - (f) The tenderer is **registered and in good standing with the compensation fund or with a licensed compensation insurer**.
  - (g) The Employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the **necessary competencies and resources to carry out the work safely**.

The Municipality does not bind itself to accept the lowest or any tender. It reserves the right to accept the whole or any part of a tender to place orders. Bidders shall not bind the Municipality to any minimum quantity per order. The successful Tenderer (s) shall be bound to provide any quantities stipulated in the specification.

The municipality has a firm intention to proceed with the work, subject to funding being identified. Notwithstanding clause F.1.1.3 of the Standard Conditions of Tender, the municipality reserves the right to award or not award the tender based on the municipalities available budget.

**F.3.15 Complete adjudicator's contract:** Refer to the **General Conditions of Contract** and the **Contract Data**.

**F.3.17 Copies of contract:** The number of paper copies of the signed contract to be provided by the Employer is **ONE (1)**.

**Bidders are required to also make an** electronic submission via SSS. Bidders must ensure that the hard copy and electronic submission are the same, failing which the submission will be deemed invalid. Bidders are responsible for resolving all access rights and submission queries before the tender closing date.

**SSS Queries Contact: Lindo Dlamini:** Tel: 031-3227133/031-3227153 email: [supplier.selfservice@durban.gov.za](mailto:supplier.selfservice@durban.gov.za)

**T1.2.3 ADDITIONAL CONDITIONS OF TENDER****T1.2.3.1 Appeals**

In terms of Regulation 49 of the Municipal Supply Chain Management Regulations persons aggrieved by decisions or actions taken by the Municipality, may lodge an appeal within 14 days of the decision or action, in writing to the Municipality. All appeals (clearly setting out the reasons for the appeal) and queries with regard to the decision of award are to be directed to:

The City Manager  
Attention Ms S. Pillay      eMail: [Simone.Pillay@durban.gov.za](mailto:Simone.Pillay@durban.gov.za)  
P O Box 1394  
DURBAN, 4000

**T1.2.3.2 Prohibition on awards to persons in the service of the state**

Clause 44 of the Supply Chain Management Regulations states that the Municipality or Municipal Entity may not make any award to a person:

- (a) Who is in the service of the State;
- (b) If that person is not a natural person, of which a director, manager, principal shareholder or stakeholder is a person in the service of the state; or
- (c) Who is an advisor or consultant contracted with the municipality or a municipal entity.

Should a contract be awarded, and it is subsequently established that Clause 44 has been breached, the Employer shall have the right to terminate the contract with immediate effect.

**T1.2.3.3 Code of Conduct and Local Labour**

The Tenderers shall make themselves familiar with the requirements of the following policies that are available on web address: <ftp://ftp.durban.gov.za/cesu/StdContractDocs/>:

- Code of Conduct;
- The Use of CLOs and Local Labour.



### T1.2.3.5 Functionality Specification

Functionality Evaluation is applicable to this tender.

The value of  $W_2$  is 100. The Functionality criteria (and sub criteria if applicable) and maximum score in respect of each of the criteria are as follows:

Functionality Criteria / Sub Criteria		Maximum Points Score
Tenderer's Experience		30
Project Organogram and Experience of Key Staff	Site Agent	10
	Civil/Structural Foremen	10
	Mechanical Lead Engineer	10
	Mechanical Superintendent	5
	Electrical Lead Engineer	10
	Electrical Superintendent	5
	Instrumentation Lead Engineer	10
Preliminary Programme & Construction Methodology		10
<b>Maximum possible score for Functionality (<math>M_s</math>)</b>		<b>100</b>

The minimum number of evaluation points for Functionality is **70**. Only those tenderers who achieve the minimum number of Functionality evaluation points (or greater) will be eligible to have their tenders further evaluated.

Functionality shall be scored by not less than three evaluators and the scores of each of the evaluators will be averaged, weighted and then totalled to obtain the final score for Functionality. Each evaluation criteria will be assessed in terms of five indicators and scores allocated according to the following table:

Level 0	Level 1	Level 2	Level 3	Level 4
0	40	70	90	100

Evaluation criteria will be adjudicated according to submissions made in accordance with the following schedules, which are found in T2.2: Returnable Schedules:

Functionality Criteria	Returnable Schedules
Tenderer's Experience	<ul style="list-style-type: none"> <li>Experience of Tenderer</li> </ul>
Project Organogram and Experience of Key Staff	<ul style="list-style-type: none"> <li>Proposed Organisation and Staffing</li> <li>Key Personnel</li> <li>CV's with Experience of Key Personnel</li> </ul>
Preliminary Programme, Methodology & Quality Control	<ul style="list-style-type: none"> <li>Preliminary Programme</li> <li>Construction Approach,</li> <li>Methodology, and Quality Control</li> <li>Schedule of Proposed Subcontractors</li> <li>Plant and Equipment</li> </ul>

Unless otherwise stated, evaluation criteria will be adjudicated with respect to the contract specific Scope of Work, as specified in C.3. In this regard the following definitions apply to the evaluation criteria prompts for judgement:

- **“successfully completed”** implies a project has been completed on time and to specification;
  - **“similar nature”** implies projects that were of a value of at least 70% of this tender’s value, and had a comparable Scope of Work in terms of technical requirements and in the case of key personnel the individual must have acted in an equivalent role;
  - **“experience/relevant experience”** implies experience on projects of a similar nature;
  - **“accredited degree / diploma”** implies a minimum 3 year qualification within the built environment, from a registered University or Institute of Technology.
- With respect to the Mechanical and Electrical Superintendent the following sub-criteria in terms of projects of similar nature shall apply:
    - Pumps (Centrifugal pumps such as submersible, immersible, end-suction, close-coupled, multi-stage pumps, axially split and positive displacement pumps) and;
    - Valves (Non-return, wedge gate, control valves and butterfly valves) and;
    - Pipework (Fabrication and installation of spool pieces, reducers and flanges) and;
    - Motors (3 Phase and single phase motors) and;
    - LV installations (lighting, motor control centres including various starting methods such as VSD, star-delta, soft starter and DOL, distribution panels, PLC’s, instrumentation and control panels).

<b>Criterion: Tenderer’s Experience</b>	
Note: Projects of a similar nature that will be considered shall be proven experience as the main or lead Contractor in the Construction, Installation and Commissioning of Water Treatment Plants in the last 10 years (Minimum Size: 10ML/day).	
<b>Level 0</b> Score = 0	No information provided; OR submission of no substance / irrelevant information provided OR < <u>3 projects</u> of a similar nature within the past 10 years.
<b>Level 1</b> Score = 40	To have successfully completed <u>3 to 4 projects</u> of a similar nature within the past 10 years.
<b>Level 2</b> Score = 70	To have successfully completed <u>5 to 6 projects</u> of a similar nature within the past 10 years.
<b>Level 3</b> Score = 90	To have successfully completed <u>7 to 8 projects</u> of a similar nature within the past 10 years.
<b>Level 4</b> Score = 100	To have successfully completed <u>9 + projects</u> of a similar nature within the past 10 years.

<b>Criterion: Project Organogram and Experience of Key Staff</b>			
<b><u>Note: Experience listed below is defined as projects on Water Treatment Works ≥ 10MI/day and have acted in an equivalent role</u></b>			
	<b>SITE AGENT</b>	<b>CIVIL / STRUCTURAL FOREMAN</b>	<b>MECHANICAL LEAD ENGINEER</b>
<b>Level 0</b> Score = 0	No information provided / irrelevant information provided / does not meet minimum educational requirement / does not meet professional registration requirement / less than five (5) years of relevant experience.	No information provided / irrelevant information provided / does not meet minimum educational requirement / Less than five (5) years of relevant experience.	No information provided / irrelevant information provided / does not meet minimum educational requirement / does not meet professional registration requirement / less than five (5) years of relevant experience.
<b>Level 1</b> Score = 40	Five (5) to Seven (7) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil/Mechanical/ Electrical/Electronic) AND Registration with ECSA as PR Eng/PR Tech Eng	Five (5) to Seven (7) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil)	Five (5) to Seven (7) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng
<b>Level 2</b> Score = 70	Eight (8) to Ten (10) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil/Mechanical/ Electrical/Electronic) AND Registration with ECSA as PR Eng/PR Tech Eng	Eight (8) to Ten (10) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil)	Eight (8) to Ten (10) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng
<b>Level 3</b> Score = 90	Ten (10) to Fifteen (15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil/Mechanical/ Electrical/Electronic) AND Registration with ECSA as PR Eng/PR Tech Eng	Ten (10) to Fifteen (15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil)	Ten (10) to Fifteen (15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng
<b>Level 4</b> Score = 100	Greater than Fifteen (>15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil/Mechanical/ Electrical/Electronic) AND Registration with ECSA as PR Eng/PR Tech Eng	Greater than Fifteen (>15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Civil)	Greater than Fifteen (>15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng

<b>Criterion: Project Organogram and Experience of Key Staff</b>			
<b>Note: Experience listed below is defined as projects on Water Treatment Works <math>\geq</math> 10MI/day and have acted in an equivalent role</b>			
	<b>MECHANICAL SUPERINTENDENT</b>	<b>ELECTRICAL LEAD ENGINEER</b>	<b>ELECTRICAL SUPERINTENDENT</b>
<b>Level 0</b> Score = 0	No information provided; OR submission of no substance / irrelevant information provided OR Qualified mechanical artisan and less than 3 years relevant experience in supervising and coordinating work of a similar nature.	No information provided / irrelevant information provided / does not meet minimum educational requirement / does not meet professional registration requirement / less than five (5) years of relevant experience.	No information provided; OR submission of no substance / irrelevant information provided OR Qualified electrical artisan and installation electrician and less than 3 years relevant experience in supervising and coordinating work of a similar nature.
<b>Level 1</b> Score = 40	Qualified mechanical artisan and a minimum of 3 years relevant experience in supervising and coordinating work of a similar nature.	Five (5) to Seven (7) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng	Qualified electrical artisan and installation electrician and a minimum of 3 years relevant experience in supervising and coordinating work of a similar nature.
<b>Level 2</b> Score = 70	Qualified mechanical artisan and a minimum of 4 years relevant experience in supervising and coordinating work of a similar nature.	Eight (8) to Ten (10) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng	Qualified electrical artisan and installation electrician and a minimum of 4 years relevant experience in supervising and coordinating work of a similar nature.
<b>Level 3</b> Score = 90	Qualified mechanical artisan and a minimum of 5 years relevant experience in supervising and coordinating work of a similar nature.	Ten (10) to Fifteen (15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng	Qualified electrical artisan and installation electrician and a minimum of 5 years relevant experience in supervising and coordinating work of a similar nature.
<b>Level 4</b> Score = 100	Qualified mechanical artisan and a minimum of 6 years relevant experience in supervising and coordinating work of a similar nature.	Greater than Fifteen (>15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng	Qualified electrical artisan and installation electrician and a minimum of 6 years relevant experience in supervising and coordinating work of a similar nature.

<b>Criterion: Project Organogram and Experience of Key Staff</b>			
<b><u>Note: Experience listed below is defined as projects on Water Treatment Works ≥ 10MI/day and have acted in an equivalent role</u></b>			
	<b>INSTRUMENTATION LEAD ENGINEER</b>		
<b>Level 0</b> Score = 0	No information provided / irrelevant information provided / does not meet minimum educational requirement / does not meet professional registration requirement / less than five (5) years of relevant experience.		
<b>Level 1</b> Score = 40	Five (5) to Seven (7) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Mechanical) AND Registration with ECSA as PR Eng/PR Tech Eng		
<b>Level 2</b> Score = 70	Eight (8) to Ten (10) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng		
<b>Level 3</b> Score = 90	Ten (10) to Fifteen (15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng		
<b>Level 4</b> Score = 100	Greater than Fifteen (>15) years of relevant experience AND BSc Degree/BEng Degree/BTech Degree/NHD in Engineering (Electrical) AND Registration with ECSA as PR Eng/PR Tech Eng		

<b>Criterion: Preliminary Programme, Methodology &amp; Quality Control</b>	
<b>Level 0</b> Score = 0	No information provided; OR submission of no substance / irrelevant information provided
<b>Level 1</b> Score = 40	<p><u>Programme</u> The programme does not adequately deal with the critical characteristics of the project or the plan and manner in which risk is to be managed.</p> <p><u>Methodology</u> The technical approach and/or methodology is less than acceptable and unlikely to satisfy project objectives or requirements. Plant and equipment is unlikely to provide adequate protection of the works. Quality control statement is generic.</p>
<b>Level 2</b> Score = 70	<p><u>Programme</u> Programme covers all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion). Programme must show the critical path</p> <p><u>Methodology</u> Brief overview of a site specific methodology which encompasses all programmed activities in appropriate order and includes staff, plant and equipment resources, including subcontractors if applicable, a brief description of preparatory work, construction processes including finishing works for each activity. Quality control statements are site specific with statements covering required sampling and testing requirements for the programmed activities.</p>
<b>Level 3</b> Score = 90	<p><u>Programme</u> In addition to the requirements of level 2, the programme covers all activities, meetings, requirements and is sufficiently flexible to accommodate changes that may be required during execution within project completion time.</p> <p><u>Methodology</u> The methodology is specifically tailored to address specific project requirements. The methods and approach to managing risk etc. are specifically tailored to the critical characteristics of the project. The plant and equipment are specifically tailored to the project requirements and are sufficiently adaptable to accommodate changes that may be required during execution. Quality control statements are site specific covering required sampling and testing for programmed activities including site specific quality control checklist for programmed activities</p>
<b>Level 4</b> Score = 100	<p><u>Programme</u> In addition to the requirements of level 3, the program covers all activities, meetings, requirements and accommodates changes and details ways to improve the overall project outcome within the completion time.</p> <p><u>Methodology</u> Besides meeting the "Level 3" rating, the important issues are approached in an innovative and efficient way, indicating that the tenderer has excellent knowledge of working in the projects environment and producing the required final product. Plant and equipment proposals and ownership/provision arrangements are most likely to ensure a satisfactory project outcome. Quality control statements are site specific covering required sampling and testing for all programmed activities including site specific quality control checklist for all programmed activities.</p>

#### T1.2.3.6 Awarding of Tender

The Awarding of the contract is subject to the availability of budget

## **PART T2: RETURNABLE DOCUMENTS**

### **T2.1 LIST OF RETURNABLE DOCUMENTS**

#### **T2.1.1 General**

The Tender Submission Documentation must be submitted in its entirety. All forms must be properly completed as required.

The Tenderer is required to complete each and every Schedule and Form listed below to the best of their ability as the evaluation of tenders and the eventual contract will be based on the information provided by the Tenderer. Failure of a Tenderer to complete the Schedules and Forms to the satisfaction of the Employer will inevitably prejudice the tender and may lead to rejection on the grounds that the tender is non-responsive.

#### **T2.1.2 Returnable Schedules, Forms and Certificates**

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**T2.2     RETURNABLE SCHEDULES, FORMS, AND CERTIFICATES**

The returnable schedules, forms, and certificates, as listed in T2.1.2, can be found on pages [20](#) to [38](#).

**NOTE**

The **Form of Offer** (C1.1.1), The **Data to be Provided by Contractor** (C1.2.2.2), and the **Bill of Quantities** (C2.2) are also required to be completed by the tenderer.



**T2.2.1 COMPULSORY ENTERPRISE QUESTIONNAIRE**

Ref	Description	Complete or Circle Applicable
1.1	Name of enterprise	
1.2	Name of enterprise's representative	
1.3	ID Number of enterprise's representative	
1.4	Position enterprise's representative occupies in the enterprise	
1.5	National Treasury Central Supplier Database Registration number	<b>MAAA</b>
1.6	eThekwini Supplier Database: Reference number (PR), if any:	<b>PR</b>
1.7	VAT registration number, if any:	
1.8	CIDB registration number, if any:	
1.9	Department of Labour: Registration number	
1.10	Department of Labour: Letter of Good Standing Certificate number	
2.0	<b>Particulars of sole proprietors and partners in partnerships (attach separate pages if more than 4 partners)</b>	
	<b>Full Name</b>	<b>Identity No.</b>
2.1		
2.2		
2.3		
2.4		
3.0	<b>Particulars of companies and close corporations</b>	
3.1	Company registration number, if applicable:	
3.2	Close corporation number, if applicable:	
3.3	Tax Reference number, if any:	
3.4	South African Revenue Service: Tax Compliance Status PIN:	

**4.0 Record in the service of the state** (Insert on a separate page if necessary)

Indicate by marking the relevant boxes with a cross, if any sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

- |   |  |
|---|--|
| <input type="checkbox"/> a member of any municipal council  | <input type="checkbox"/> a member of any provincial legislature  |
| <input type="checkbox"/> an official of any municipality or municipal entity  | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity |
| <input type="checkbox"/> a member of the board of directors of any municipal entity   | <input type="checkbox"/> a member of the National Assembly or the National Council of Province           |
| <input type="checkbox"/> an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999) | <input type="checkbox"/> an employee of Parliament or a provincial legislature                           |

Name of sole proprietor, partner, director, manager, principal shareholder or stakeholder	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 mths

**5.0 Record of spouses, children and parents in the service of the state** (Insert on a separate page if necessary)

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

- |   |  |
|---|--|
| <input type="checkbox"/> a member of any municipal council  | <input type="checkbox"/> a member of any provincial legislature  |
| <input type="checkbox"/> an official of any municipality or municipal entity  | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity |
| <input type="checkbox"/> a member of the board of directors of any municipal entity   | <input type="checkbox"/> a member of the National Assembly or the National Council of Province           |
| <input type="checkbox"/> an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999) | <input type="checkbox"/> an employee of Parliament or a provincial legislature                           |

Name of spouse, child or parent	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 mths

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

- i) authorizes the Employer to verify the tenderers tax clearance status from the South African Revenue Services that it is in order.
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004.
- iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption.
- iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest.
- v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

NAME (Block Capitals):

Date

SIGNATURE:

**T2.2.2 CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING / SITE INSPECTION**

Reference is to be made to Clauses F.2.1(c) and F.2.7 of the Tender Data.

This is to certify that:

(entity name):

of (address):

was represented by the person(s) named below at the Clarification Meeting held for all tenderers, the details of which are stated in the Tender Data (F.2.7).

I / We acknowledge that the purpose of the meeting was to acquaint myself / ourselves with the site of the works and / or matters incidental to doing the work specified in the tender documents in order for me / us to take account of everything necessary when compiling our rates and prices included in the tender.

**Particulars of person(s) attending the meeting:**

Name: .....

Name: .....

Signature: .....

Signature: .....

Capacity: .....

Capacity: .....

**Attendance of the above person(s) at the meeting is confirmed by the Employer's Agent's Representative, namely:**

Name: .....

Signature: .....

Date: .....

**T2.2.3 TAX COMPLIANCE STATUS PIN**

Reference is to be made to Clauses F.2.23 and F.3.13(a) of the Tender Data.

SARS has introduced a new Tax Compliance Status System. Tenderers can submit a Tax Compliance Status PIN (TCS PIN) instead of an original Tax Clearance Certificate. This TCS PIN can be used by third parties to certify the taxpayer's real-time compliance status.

Separate TCS PINs are required for each entity in a Joint Venture.

The TCS PIN(s) are to be entered under item 3.4 on form **T2.1.2.1: Compulsory Enterprise Questionnaire**.

**Tenderers are to include, at the back of their submission document, a printout of their Tax Compliance Status PIN (TCS PIN) OR an original Tax Clearance Certificate.**

**Failure to include the required document will make the tender submission non-responsive.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the entity, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the submission.***

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_

**T2.2.4 CONTRACTOR'S HEALTH AND SAFETY DECLARATION**

**If Functionality is applicable as part of tender evaluation, reference is to be made to Clause F3.11.9 of the of the Conditions of Tender.**

Reference is to be made to Clauses F.2.1(e) and F.2.23 of the Tender Data.

In terms of Clause 5(1)(h) of the OHSa 1993 Construction Regulations 2014 (referred to as "the Regulations" hereafter), a Principal Contractor may only be appointed to perform construction work if the Client is satisfied that the Principal Contractor has the necessary competencies and resources to carry out the work safely in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHSa 1993 Construction Regulations 2014.

To that effect, a person duly authorised by the tenderer, must complete and sign the declaration hereafter in detail.

**Declaration by Tenderer**

- 1 I, the undersigned, hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No 181 of 1993), and the OHSa 1993 Construction Regulations 2014.
- 2 I hereby declare that my company has the competence and the necessary resources to safely carry out the construction work under this contract in compliance with the Construction Regulations and the Employer's Health and Safety Specifications.
- 3 I propose to achieve compliance with the Regulations by one of the following **(Tenderers are to Circle Applicable - Yes or No)**:

- (a) From my own competent resources as detailed in 4(a) hereafter.
- (b) From my own resources still to be appointed or trained until competency is achieved, as detailed in 4(b) hereafter:
- (c) From outside sources by appointment of competent specialist Subcontractors as detailed in 4(c) hereafter:

Circle Applicable	
Yes	NO
Yes	NO
YES	NO

- 4 Details of resources I propose:  
(Note: Competent resources shall include safety personnel such as a construction supervisor and construction safety officer as defined in Regulation 8, and competent persons as defined in Regulations 9, 10, 11, 12, 13, 14, 16, 17, 20, 21, 22, 23(1), 24, 25, 26, 27, 28 and 29, as applicable).
- (a) Details of the competent and qualified key persons from my company's own resources, who will form part of the contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

(b) Details of training of persons from my company's own resources (or to be hired) who still have to be trained to achieve the necessary competency:

(i) By whom will training be provided?

(ii) When will training be undertaken?

(iii) Positions to be filled by persons to be trained or hired:


(c) Details of competent resources to be appointed as subcontractors if competent persons cannot be supplied from own company:

Name of proposed subcontractor:

Qualifications or details of competency of the subcontractor:


- 5 I, the undersigned, hereby undertake, if this tender is accepted, to provide, before commencement of the works under the contract, a suitable and sufficiently documented Health and Safety Plan in accordance with Regulation 7(1) of the Construction Regulations, which plan shall be subject to approval by the Client.
- 6 I, the undersigned, confirm that copies of this company's approved Health and Safety Plan, the Client's Safety Specifications as well as the OHSA 1993 Construction Regulations 2014 will be provided on site and will at all times be available for inspection by the Principal Contractor's personnel, the Client's personnel, the Employer's Agent, visitors, and officials and inspectors of the Department of Labour.
- 7 I, the undersigned, hereby confirm that adequate provision has been made in the tendered rates and prices in the Bill of Quantities to cover the cost of all resources, actions, training and all health and safety measures envisaged in the OHSA 1993 Construction Regulations 2014, and that I will be liable for any penalties that may be applied by the Client in terms of the said Regulations (Regulation 33) for failure on the Principal Contractor's part to comply with the provisions of the Act and the Regulations.
- 8 I, the undersigned, agree that failure to complete and execute this declaration to the satisfaction of the Client will mean that this company is unable to comply with the requirements of the OHSA 1993 Construction Regulations (2014) and accept that this tender will be prejudiced and may be rejected at the discretion of the Client.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.5 MBD 4: DECLARATION OF INTEREST**

MSCM Regulations: “**in the service of the state**” means to be:

- (a) a member of:
  - (i) any municipal council.
  - (ii) any provincial legislature.
  - (iii) the national Assembly or the national Council of provinces.
- (b) a member of the board of directors of any municipal enterprise.
- (c) an official of any municipality or municipal enterprise.
- (d) an employee of any national or provincial department, national or provincial public enterprise or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999).
- (e) a member of the accounting authority of any national or provincial public enterprise.
- (f) an employee of Parliament or a provincial legislature.

“**Shareholder**” means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

- 1 No bid will be accepted from persons **in the service of the state**<sup>1</sup>.
- 2 Any person, having a kinship with persons **in the service of the state**, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to **persons in service of the state**, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.
- 3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Name of enterprise

Name of enterprise’s representative

3.2 ID Number of enterprise’s representative

3.3 Position enterprise’s representative occupies in the enterprise

3.4 Company Registration number

3.5 Tax Reference number

3.6 VAT registration number

3.7 The names of all directors / trustees / shareholders / members / sole proprietors / partners in partnerships, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below. In the case of a joint venture, information in respect of each partnering enterprise must be completed and submitted.

Complete T2.1.2.1 Item 1.1
Complete T2.1.2.1 Item 1.2
Complete T2.1.2.1 Item 1.3
Complete T2.1.2.1 Item 1.4
Complete T2.1.2.1 Item 3.1 or 3.2
Complete T2.1.2.1 Item 3.3
Complete T2.1.2.1 Item 1.7

3.8 Are you presently in the service of the state?

If yes, furnish particulars: .....

Circle Applicable	
YES	NO

3.9 Have you been in the service of the state for the past twelve months?

If yes, furnish particulars: .....

YES	NO
-----	----

3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid?

YES

NO

If yes, furnish particulars: .....

.....

3.11 Are you, aware of any relationship (family, friend, other) between any other bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid?

YES

NO

If yes, furnish particulars: .....

.....

3.12 Are any of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state?

YES

NO

If yes, furnish particulars: .....

.....

3.13 Are any spouse, child or parent of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state?

YES

NO

If yes, furnish particulars: .....

.....

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract?

YES

NO

If yes, furnish particulars: .....

.....

- 4 The names of all directors / trustees / shareholders / members / sole proprietors / partners in partnerships, their individual identity numbers and state employee numbers must be indicated below. In the case of a joint venture, information in respect of each partnering enterprise must be completed and submitted

Full Name	Identity No.	State Employee No.	Personal income tax No.
Use additional pages if necessary			

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

NAME (Block Capitals):

Date

.....

SIGNATURE:

.....

.....



**T2.2.6 MBD 5: DECLARATION FOR PROCUREMENT ABOVE R10 MILLION**  
**(ALL APPLICABLE TAXES INCLUDED)**

For all procurement expected to exceed R10 million (all applicable taxes included), bidders must complete the following questionnaire.

Circle Applicable	
YES	NO
<p>1.0 Are you by law required to prepare annual financial statements for auditing?</p> <p>1.1 <b>If YES, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.</b></p>	
<p>2.0 Do you have any outstanding undisputed commitments for municipal services towards any municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days?</p> <p>2.1 If NO, this serves to certify that the bidder has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for more than 30 days.</p> <p>2.2 If YES, provide particulars.</p> <p>.....</p> <p>.....</p>	
<p>3.0 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract?</p> <p>3.1 If YES, provide particulars.</p> <p>.....</p> <p>.....</p>	
<p>4.0 Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic?</p> <p>4.1 If YES, provide particulars.</p> <p>.....</p> <p>.....</p>	

**If required by 1.1 above, tenderers are to include, at the back of their tender submission document, a printout of their audited annual financial statements.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, and, if required, that the requested documentation has been included in the tender submission.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.7 MBD 6.1: PREFERENCE POINTS CLAIM**  
**In terms of THE PREFERENTIAL PROCUREMENT REGULATIONS (2022)**

**Reference is to be made to Clause F.3.11 of the Tender Data.**

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

**NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022**

## **1.0 GENERAL CONDITIONS**

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included).
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 Either the 80/20 or 90/10 preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the applicable system once tenders are received.

1.3 Preference Points for this tender shall be awarded for:

- **Price and Specific Goals:** Either 80 or 90 (price) and 20 or 10 (specific goals), in terms of 1.2 above.
- The total Preference Points, for Price and Specific Goals, is 100.

1.4 Failure on the part of the tenderer to submit the required proof or documentation, in terms of the requirements in the Conditions of Tender for claiming specific goal preference points, will be interpreted that preference points for specific goals are not claimed.

1.5 The Municipality reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard of preferences, in any manner required by the Municipality.

## **2.0 DEFINITIONS**

2.1 **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation.

2.2 **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts.

2.3 **“rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes.

2.4 **“tender for income-generating contracts”** means a written offer in the form determined by Municipality in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the Municipality and a third party that produces revenue for the Municipality, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions.

2.5 **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

### 3.0 FORMULA FOR CALCULATION OF PREFERENCE PRICE POINTS

#### 3.1 PROCUREMENT OF GOODS AND SERVICES

**POINTS AWARDED FOR PRICE:** A maximum of 80 or 90 points is allocated for price on the following basis:

OR

#### 90 / 10 Points System

$$P_s = 90 \left( 1 - \frac{P_t - P_{min}}{P_{min}} \right)$$

Where:

$P_s$  = Points scored for price of tender under consideration

$P_t$  = Price of tender under consideration

$P_{min}$  = Price of lowest acceptable tender

#### 4.0 POINTS AWARDED FOR SPECIFIC GOALS

- 4.1 In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goal(s) stated in **Table 1** below, as supported by proof/ documentation stated in the **Conditions of Tender**:
- 4.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of:
- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system, or
  - (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,
- then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

**TABLE 1:** Specific Goals for the tender and maximum points for each goal are indicated per the table below.

**Tenderers are to indicate their points claim for each of the Specific Goals in the shaded blocks.**

The Specific Goals to be allocated points in terms of this tender	Maximum Number of points ALLOCATED (80/20 system)	Maximum Number of points ALLOCATED (90/10 system)	Number of points CLAIMED (80/20 system)	Number of points CLAIMED (90/10 system)
<b>Ownership Goal:</b> Race (black)	14	7		
<b>RDP Goal:</b> The promotion of enterprises located in a specific municipal area.	6	3		
<b>Total CLAIMED Points (Maximum)</b>				

I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, certify that the points claimed, based on the specific goals as specified in the tender, qualifies the tendering entity for the preference(s) shown.

I acknowledge that:

- 1) The information furnished is true and correct.
- 2) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form.
- 3) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct.
- 4) If the specific goals have been claimed or obtained on a fraudulent basis, or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have:
  - (a) disqualify the person from the tendering process.
  - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct.
  - (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation.
  - (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
  - (e) forward the matter for criminal prosecution, if deemed necessary.

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_

**T2.2.8 MBD 8: DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES**

- 1.0 This Municipal Bidding Document must form part of all bids invited.
- 2.0 It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
- 3.0 The bid of any bidder may be rejected if that bidder, or any of its directors have:
- a) abused the municipal entity's supply chain management system or committed any improper conduct in relation to such system.
  - b) been convicted for fraud or corruption during the past five years.
  - c) wilfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years.
  - d) been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004).
- 4.0 In order to give effect to the above, the following questions must be completed and submitted with the bid.

- 4.1 Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector?

(Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer / Authority of the institution that imposed the restriction after the audi alteram partem rule was applied.)

The Database of Restricted Suppliers now resides on the National Treasury's website ([www.treasury.gov.za](http://www.treasury.gov.za)) and can be accessed by clicking on its link at the bottom of the home page.

Circle Applicable	
YES	NO

- 4.1.1 If YES, provide particulars.

.....

.....

- 4.2 Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)?

The Register for Tender Defaulters can be accessed on the National Treasury's website ([www.treasury.gov.za](http://www.treasury.gov.za)) by clicking on its link at the bottom of the home page.

YES	NO
-----	----

- 4.2.1 If YES, provide particulars.

.....

.....

- 4.3 Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?

YES	NO
-----	----

- 4.3.1 If YES, provide particulars.

.....

.....

- 4.4 Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?

YES

NO

4.4.1 If YES, provide particulars.

.....

.....

- 4.5 Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?

YES

NO

4.5.1 If YES, provide particulars.

.....

.....

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

*I accept that, in addition to cancellation of a contract, action may be taken against me should this declaration prove to be false.*

**NAME (Block Capitals):**

**Date**

.....

**SIGNATURE:**

.....

.....

**T2.2.9 MBD 9: CERTIFICATE OF INDEPENDENT BID DETERMINATION****NOTES**

- <sup>1</sup> Includes price quotations, advertised competitive bids, limited bids and proposals.
- <sup>2</sup> Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.
- <sup>3</sup> Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

- 1.0 This Municipal Bidding Document (MBD) must form part of all **bids**<sup>1</sup> invited.
- 2.0 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or **bid rigging**).<sup>2</sup> Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
- 3.0 Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
- a. take all reasonable steps to prevent such abuse;
  - b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
  - c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.
- 4.0 This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of **bid rigging**.
- 5.0 In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid.

**CERTIFICATE OF INDEPENDENT BID DETERMINATION**

I, the undersigned, in submitting the accompanying bid:

-----  
(Bid Number and Description)

in response to the invitation for the bid made by:

-----  
(Name of Municipality / Municipal Entity)

do hereby make the following statements that I certify to be true and complete in every respect.

I certify, on behalf of:

-----  
(Name of Bidder)

that:

1. I have read and I understand the contents of this Certificate.
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect.
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
  - (a) has been requested to submit a bid in response to this bid invitation.
  - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience.
  - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder.
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement, or arrangement with any competitor. However, communication between partners in a joint venture or consortium<sup>3</sup> will not be construed as collusive bidding.



7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
- (a) prices.
  - (b) geographical area where product or service will be rendered (market allocation).
  - (c) methods, factors or formulas used to calculate prices.
  - (d) the intention or decision to submit or not to submit, a bid.
  - (e) the submission of a bid which does not meet the specifications and conditions of the bid.
  - (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements, or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

#### **T2.2.10 JOINT VENTURES AGREEMENTS**

Joint Venture agreement and Power of Attorney Agreements to be attached here (if applicable).

**T2.2.11 RECORD OF ADDENDA TO TENDER DOCUMENTS**

I / We confirm that the following communications received from the Employer or his representative before the date of submission of this tender offer, amending the tender documents, have been taken into account in this tender offer.

ADD.No	DATE	TITLE OR DETAILS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

***It is also confirmed that the requirements, as stated on the Addenda, have been complied with.***

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_

**T2.2.12 ELIGIBILITY: DECLARATION OF MUNICIPAL FEES**

Reference is to be made to Clause F.2.1(f)(ii) of the Tender Data.

I, the undersigned, do hereby declare that the Municipal fees of:

.....  
(full name of Company / Close Corporation / partnership / sole proprietary/Joint Venture)

(hereinafter referred to as the TENDERER) are, as at the date hereunder, fully paid or an Acknowledgement of Debt has been concluded with the Municipality to pay the said charges in instalments.

The following account details relate to property of the said TENDERER:

<u>Account</u>	<u>Account Number: to be completed by tenderer</u>											
Consolidated Account												
Electricity												
Water												
Rates												
JSB Levies												
Other												

I acknowledge that should the aforesaid Municipal charges fall into arrears, the Municipality may take such remedial action as is required, including termination of any contract, and any payments due to the Contractor by the Municipality shall be first set off against such arrears.

- Where the tenderer's place of business or business interests are outside the jurisdiction of eThekweni municipality, a copy of the accounts/ agreements from the relevant municipality are to be provided.
- Where the tenderer's Municipal Accounts are part of their lease agreement, then a copy of the agreement, or an official letter to that effect, is to be provided.

**Tenderers are to include, at the back of their tender submission document, a printout of the above account's and or agreements signed with the municipality.**

**Failure to include the required document will make the tender submission non-responsive.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.13 ELIGIBILITY: REGISTRATION WITH COMPENSATION COMMISSIONER**

Reference is to be made to Clause F.2.1(f)(i) of the Tender Data.

The Occupational Injuries and Diseases Act (130 of 1993 as amended) (the Act) refers. A summary of the pertinent Clauses are listed below. The act is to be referenced for the full text of the clauses.

**Clause 80: Employer to register with commissioner and furnish him with particulars**

The Act requires that an Employer carrying out business in the Republic to register with the Compensation Commissioner. Any person who fails to comply with the provisions of the this clause is guilty of an offence.

**Clause 82: Employer to furnish returns of earnings**

The Act requires an Employer to furnish the commissioner with a return showing:

- The amount of earnings paid by him to his employees.
- Any further information as may be prescribed or as the commissioner may require.

Any Employer who fails to comply with the provisions of the this clause is guilty of an offence.

**Clause 86: Assessment to be paid by an employer to commissioner**

The Act states that an Employer will receive notices of assessment from the commissioner. The Employer must pay the commissioner the assessment amount on the notices.

**Clause 89: Mandators and contractors**

The Act requires a contractor (a person with a contract with a mandator) to register as an Employer in accordance with the provisions of the Act and pay the necessary assessments. Failing registration or payment of assessments, the mandator is required to pay the assessments in respect of the employees of the contractor. The mandator is allowed to recover the assessment amounts paid from the contractor.

The Department of labour issues contractors with a **Letter of Good Standing** if the contractor has complied with the requirement(s) of the Act and is in "good standing" with the Compensation Fund. Employers can check the validity of such Letters of Good Standing on the internet (<https://cfoonline.labour.gov.za/VerifyLOGS> ).

**Tenderers are to include, at the back of their tender submission document, a printout of their most recent Letter of Good Standing from the Department of Labour.**

**Failure to include the required document will make the tender submission non-responsive.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.14 ELIGIBILITY: CSD REGISTRATION REPORT**

Reference is to be made to Clauses F.2.1(e) and F.2.23 of the Tender Data.

The Conditions of Tender, Clause F.2.1: Eligibility, requires a tenderer to be registered, at the time of tender closing, on the **National Treasury Central Supplier Database (CSD)** as a service provider.

CSD Registration Reports can be obtained from the National Treasury's CSD website at <https://secure.csd.gov.za/Account/Login>.

The date of obtaining the printout is to be indicated on the printout.

The following is an example of the beginning of the printout obtained from the above website.

SUPPLIER IDENTIFICATION			
Supplier number		Have Bank Account	
Is supplier active?		Total annual turnover	
Supplier type		Financial year start date	
Supplier sub-type		Registration date	
Legal name		Created by	
Trading name		Created date	
Identification type		Edit by	
Government breakdown		Edit date	
Business status		Restricted Supplier	
Country of origin		Restriction Last Verification Date	
South African company/CC registration number			

**Tenderers are to include, at the back of their tender submission document, a printout of their (full) CSD Registration Report.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.15 ELIGIBILITY: VERIFICATION OF CIDB REGISTRATION AND STATUS**

Reference is to be made to Clause F.2.1.1 and F.2.23 of the Tender Data.

The Conditions of Tender, **Clause F.2.1.1: Eligibility**, requires a tenderer to be registered, as "Active", with the CIDB (at time of tender closing), in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations. The required class of construction work is specified in Clause F.2.1.1.

CIDB Registrations can be obtained from the CIDB website at <https://registers.cidb.org.za/PublicContractors/ContractorSearch>. The date of obtaining the printout is to be indicated on the printout.

The following is an example of the beginning of the printout obtained from the above website.

Home

Contractor Detail Print

Contractor Detail

CRS Number: Type of Enterprise:

Contractor Name: Registration Date:

Trading Name: Expiry Date:

Status:

Contractor Grades

Grade:

Back

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[Website technical enquires contact](#)

01/01/2017

**Tenderers are to include, at the back of their tender submission document, a printout of their registration with the CIDB.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_





**T2.2.17 PROPOSED ORGANISATION and STAFFING**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

The tenderer should propose the structure and composition of their team i.e. the main disciplines involved, the key staff member / expert responsible for each discipline, and the proposed technical and support staff and site staff.

The roles and responsibilities of each key staff member / expert should be set out as job descriptions. In the case of an association / joint venture / consortium, it should, indicate how the duties and responsibilities are to be shared.

The tenderer must attach his / her organization and staffing proposals to this page. (this is to include both the on-site and off-site staffing resources used for this project)

In addition to any lists, this information should also be shown in an organogram format (flow chart) clearly indicating the staff hierarchy and reporting lines, again for on- and off-site resources.

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.18      KEY PERSONNEL**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

The Tenderer shall list below the personnel which he intends to utilize on the Works, including key personnel (Contract's Manager, Site Agent, and Foremen) which may have to be brought in from outside if not available locally.

CATEGORY OF EMPLOYEE	NUMBER OF PERSONS	
	KEY PERSONNEL, PART OF THE CONTRACTOR'S ORGANISATION	KEY PERSONNEL TO BE IMPORTED IF NOT AVAILABLE LOCALLY
Contracts Manager		
Site Agent **		
Civil / Structural Foreman **		
Mechanical Lead Engineer **		
Mechanical Superintendent **		
Electrical Lead Engineer **		
Electrician Superintendent **		
Instrumentation Lead Engineer **		
Health and Safety Officer **		
Quality Assurance Officer and Quality Control Officer		
Environmental Compliance Officer**		
Others: .....		
.....		

Note: CVs of key personnel may be requested during the contract period.

\*\* CV's shall be provided for these personnel

Should any of the key staff members not be available for deployment to this contract upon award, only approved candidates with similar or better credentials will be considered by the Employer. The following key personnel shall be based **full-time** on site for the entire duration of the Contract:

- Site Agent
- Civil/Structural Foremen
- Mechanical Superintendent
- Electrical Superintendent

The following key personnel shall be based **part-time** on site for the entire duration of the Contract:

- Mechanical Lead Engineer
- Electrical Lead Engineer
- Instrumentation Lead Engineer

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.19 EXPERIENCE OF KEY PERSONNEL**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

The experience of assigned staff member in relation to the Scope of Work will be evaluated from three different points of view:

- 1) General experience (total duration of professional activity), level of education and training and positions held of each discipline specific team leader.
- 2) The education, training, skills and experience of the Assigned Staff in the specific sector, field, subject, etc which is directly linked to the scope of work.
- 3) The key staff members' / experts' knowledge of issues which the tenderer considers pertinent to the project e.g. local conditions, affected communities, legislation, techniques etc.

**A CV of each key personnel of not more than 4 pages should be attached to this schedule, key personnel include:**

- **Site Agent**
- **Civil/Structural Foremen**
- **Mechanical Lead Engineer**
- **Mechanical Superintendent**
- **Electrical Lead Engineer**
- **Electrical Superintendent**
- **Instrumentation Lead Engineer**

Each CV should be structured under the following headings:

- a) Personal particulars
  - name
  - date and place of birth
  - place (s) of tertiary education and dates associated therewith
  - professional awards
- b) Qualifications (degrees, diplomas, grades of membership of professional societies and professional registrations)
- c) Skills
- d) Name of current employer and position in enterprise
- e) Overview of post-graduate / diploma experience (year, organization and position)
- f) Outline of recent assignments / experience that has a bearing on the scope of work
- g) Indication of the Capacity of Water Treatment Works undertaken.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_



**T2.2.21 CONSTRUCTION APPROACH, METHODOLOGY, AND QUALITY CONTROL**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

**Construction Approach and Methodology**

The construction approach and methodology must respond to the Scope of Work and outline the proposed approach to undertake the work showing a detailed programme including health and safety aspects, the use of plant and resources for this Project.

**Quality Control**

The quality control statement must discuss what tests and control measures are to be employed on site to attain the specified results and is to cover the program associated activities.

**The tenderer must attach his / her Construction Methodology to this page.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):****Date****SIGNATURE:**



**T2.2.23 PLANT and EQUIPMENT**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

The following are lists of major items of relevant equipment that I / we presently own or lease and will have available for this contract if my / our tender is accepted.

(a) Details of major equipment that is owned by me / us and immediately available for this contract.

DESCRIPTION (type, size, capacity etc)	QUANTITY	YEAR OF MANUFACTURE

*Attach additional pages if more space is required*

(b) Details of major equipment that will be hired, or acquired for this contract if my / our tender is accepted

DESCRIPTION (type, size, capacity etc)	QUANTITY	HOW ACQUIRED	
		HIRE/ BUY	SOURCE

*Attach additional pages if more space is required*

The Tenderer undertakes to bring onto site without additional cost to the Employer any additional plant not listed but which may be necessary to complete the contract within the specified contract period.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**



**T2.2.24 CONTRACTOR'S HEALTH AND SAFETY PLAN**

Refer to Clause F3.11.9 for Functionality Points evaluation prompts (if applicable).

At tender stage only a brief overview (**to be attached to this page**) of the tenderers perception on the safety requirements for this contract will be adequate.

Only the successful Tenderer **shall submit separately** the Contractor's Health and Safety Plan as required in terms of Regulation 7 of the Occupational Health and Safety Act 1993 Construction Regulations 2014.

The detailed safety plan will take into consideration the site specific risks as mentioned under **C.3: Project Specification**. A generic plan will not be acceptable.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**PART C1: AGREEMENT AND CONTRACT DATA****C1.1: FORM OF OFFER AND ACCEPTANCE****C1.1.1: OFFER**

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

Contract No: **31302-5W**

Contract Title: **Tonga Water Treatment Works Functional Upgrade**

The Tenderer, identified in the Offer signature block below, has examined the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the Tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance, the Tenderer offers to perform all of the obligations and liabilities of the Contractor under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

**\* The offered total of the prices inclusive of Value Added Tax is:**

R..... (In words .....  
.....)

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document to the Tenderer before the end of the period of validity stated in the Tender Data, whereupon the Tenderer becomes the party named as the Contractor in the Conditions of Contract identified in the Contract Data.

**For the Tenderer:**

**\* Name of Tenderer** (organisation) : .....

**\* Signature** (of person authorized to sign the tender) : .....

**\* Name** (of signatory in capitals) : .....

**Capacity** (of Signatory) : .....

**Address** : .....

: .....

**Telephone** : .....

**Witness:**

**Signature** : ..... **Date** : .....

**Name** (in capitals) : : .....

**Notes:**

**\* Indicates what information is mandatory.**

**Failure to complete the mandatory information and sign this form will invalidate the tender.**

**C1.1: FORM OF OFFER AND ACCEPTANCE****C1.1.2: FORM OF ACCEPTANCE****This Form will be completed by the Employer**

By signing this part of the Form of Offer and Acceptance, the Employer identified below accepts the Tenderer's Offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the Conditions of Contract identified in the Contract Data. Acceptance of the Tenderer's Offer shall form an agreement between the Employer and the Tenderer upon the terms and conditions contained in this Agreement and in the Contract that is the subject of this Agreement.

The terms of the contract are contained in:

- Part C1 : Agreement and Contract Data, (which includes this Agreement)
- Part C2 : Pricing Data, including the Bill of Quantities
- Part C3 : Scope of Work
- Part C4 : Site Information

and the schedules, forms, drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C4 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules as well as any changes to the terms of the Offer agreed by the Tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule, which must be duly signed by the authorised representatives of both parties.

The Tenderer shall within two weeks after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date this Agreement comes into effect. Failure to fulfill any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now Contractor) within five days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute a binding contract between the parties.

**Signature** (*person authorized to sign the acceptance*) : .....

**Name** (*of signatory in capitals*) : .....

**Capacity** (*of Signatory*) : .....

**Name of Employer** (*organisation*) : .....

**Address** : .....

: .....

**Witness:**

**Signature** : ..... **Date** : .....

**Name**(*in capitals*) : : .....

**C1.1: FORM OF OFFER AND ACCEPTANCE**  
**C1.1.3: SCHEDULE OF DEVIATIONS**

**This form will be completed by THE EMPLOYER and ONLY THE SUCCESSFUL TENDERER**

1.

Subject

Details

:

:

:
2.

Subject

Details

:

:

:
3.

Subject

Details

:

:

:

By the duly authorised representatives signing this Schedule of Deviations, the Employer and the Tenderer agree to and accept the foregoing Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, as well as any confirmation, clarification or change to the terms of the offer agreed by the Tenderer and the Employer during this process of offer and acceptance.

FOR THE TENDERER		FOR THE EMPLOYER
.....	Signature	.....
.....	Name ( <i>in capitals</i> )	.....
.....	Capacity	.....
.....	Name and Address of	.....
.....	Organisation	.....
.....		.....
.....		.....
.....	Witness Signature	.....
.....	Witness Name	.....
.....	Date	.....

## C1.2: CONTRACT DATA

### C1.2.1 CONDITIONS OF CONTRACT

#### C1.2.1.1 GENERAL CONDITIONS OF CONTRACT

The Conditions of Contract are the **General Conditions of Contract for Construction Works (2015 3<sup>rd</sup> Edition)**, (GCC 2015) published by the South African Institution of Civil Engineering. Copies of these conditions of contract may be obtained from the South African Institution of Civil Engineering (Tel: 011-805-5947, Fax: 011-805-5971, E-mail: [civilinfo@saice.org.za](mailto:civilinfo@saice.org.za)).

The Contract Data (including variations and additions) shall amplify, modify, or supersede, the GCC 2015 to the extent specified below, and shall take precedence and shall govern.

Each item of data given below is cross-referenced to the clause in the GCC 2015 to which it mainly applies.

### C1.2.2 CONTRACT DATA

#### C1.2.2.1 DATA TO BE PROVIDED BY THE EMPLOYER

- 1.1.1.13 The **Defects Liability Period**, from the date of the Certificate of Completion, is **1 Year**.
- 1.1.1.14 The **time for achieving Practical Completion**, from the Commencement Date is **300 Days**, the Contract also includes a **90 days** Trial Operation Period which shall commence once Practical Completion is achieved. The whole of the Works (including Trial Operation Period) shall be completed within **390 days**. The period as stated in 5.3.2, and the period referred to in 5.3.3, are included in the above time for achieving Practical Completion. The special non-working days as stated in 5.8.1 are excluded from the above time for achieving Practical Completion.
- 1.1.1.15 The Employer is the eThekweni Municipality as represented by:  
Deputy Head: **Water & Sanitation Engineering**
- 1.2.1.2 The address of the Employer is:  
Physical: **Water and Sanitation Unit, 133 K.E. Masinga Road, DURBAN, 4001**  
Postal: **Water and Sanitation Unit, P O Box 1038, DURBAN, 4000**  
Telephone: **031-311-8794 (t)**  
Fax: **031-311-8747 (f)**  
E-Mail: **Shalina.Ramnund@durban.gov.za**
- 1.1.1.16 The **name of the Employer's Agent** is
- 1.2.1.2 The address of the Employer' Agent is:  
Physical: **No 5 The Boulevard, Westway Office Park, 7 Harry Gwala Road, Westville, 3635**  
Postal: **N/A**  
Telephone: **031 265 6007**  
Fax: **031 265 6011**  
E-Mail: **Terence.Thumbaya@naiduconsulting.com**
- 1.1.1.26 The **Pricing Strategy** is by **Re-measurement Contract**.
- 3.2.3 The Employer's Agent shall obtain the **specific approval of the Employer** before executing any of his functions or duties according to the following Clauses of the General Conditions of Contract:
- 6.3: Council approval in order to authorise any expenditure in excess of the Tender Sum plus **15% contingencies**.

- 4.11.1 To carry out and complete the works, the Contractor shall employ competent key staff. It is a requirement that should any of the key staff members not be available for deployment to this contract upon award, only approved candidates with similar or better credentials will be considered by the Employer. The CV's should be submitted to the Employer's Agent's Representative for acceptance by the Department (reference is made to Cl.5.3.1 of the Contract Data). The Contractor is to also ensure that a suitably qualified Contracts Manager is also appointed for the duration of this Contract.
- 5.3.1 The **documentation required** before commencement with Works execution are:
- Health and Safety Plan (refer to Clause 4.3)
  - Initial Programme (refer to Clause 5.6)
  - Security (refer to Clause 6.2)
  - Insurance (refer to Clause 8.6)
  - CV(s) of Key Site Staff (refer to Clause 4.11.1)
  - CPG Implementation Plan (if applicable)
- 5.3.2 The **time to submit the documentation** required before commencement with Works is **37 Days**.
- 5.3.3 Add the following paragraph:
- "If a construction work permit, in terms of Clause 3(1) of the Construction Regulations (2014), is applicable, the instruction to commence carrying out of the works may only be issued once the construction work permit has been obtained by the Employer's Agent. If a construction work permit is applicable, the contractor shall allow for a minimum period of 37 days, after the submission (or re-submission) of the documentation referred to in Clause 5.3.1., for the issuing of the construction work permit."
- 5.4.2 The access and possession of Site shall not be exclusive to the Contractor. The Employer shall grant the Contractor access to the treatment works to perform the required construction and commissioning activities (including the Trial Operation Period), whilst ensuring the continuity of the Employer's operational activities. Access arrangements shall be shared and coordinated to facilitate the Contractor's work without compromising the operational integrity of the treatment works.
- The Employer is responsible for:
- a) Ensuring that reasonable access is provided to the Contractor for the execution of the works, in accordance with the agreed schedule.
  - b) Communicating any operational constraints or specific requirements that may impact the Contractor's activities.
  - c) Communicating with the Contractor to address potential conflicts between operational activities and construction works.
- The Contractor is responsible for:
- i) Adhering to the Employer's access protocols, operational constraints, and safety requirements while on-site.
  - ii) Scheduling and executing work to minimize interference with the Employer's ongoing operations.
  - iii) Maintaining open communication with the Employer to ensure the smooth coordination of shared access.
  - iv) Any conflicts or delays arising from shared access arrangements shall be resolved through mutual consultation to ensure progress while maintaining the treatment works' operational functionality.
  - v) Coordinating with the Employer to address potential conflicts between operational activities and construction works.
  - vi) Holding ongoing coordination meetings at an interval agreed with the Employer.

5.8.1 The **non-working days** are **Saturdays and** Sundays.

(5.1.1) The **special non-working** days are:

- All statutory holidays as declared by National or Regional Government.
- The year-end break:
  - Commencing on the first working day after 15 December.
  - Work resumes on the first working day after 5 January of the next year.

5.8.1 Delete the words “sunset and sunrise” and replace with “17:00 and 07:00”.

5.12.2.2 **Abnormal Climatic Conditions (Rain Delays)** - The numbers of days per month, on which work is expected not to be possible as a result of rainfall, for which the Contractor shall make provision, is given in the table below. During the execution of the Works, the Employer's Agent's Representative will certify a day lost due to rainfall only if at least 75% of the work force and plant on site could not work during that specific working day.

Extension of time as a result of rainfall shall be calculated monthly being equal to the number days certified by the Employer's Agent's Representative as lost due to rainfall, less the number of days allowed for as in table below, which could result in a negative figure for certain months. The total extension of time for which the Contractor may apply, shall be the cumulative algebraic sum of the monthly extensions. Should the sum thus obtained be negative, the extension of time shall be taken as NIL.

<u>Month</u>	<u>Days Lost</u>	<u>Average Rainfall</u>	<u>Month</u>	<u>Days Lost</u>	<u>Average Rainfall</u>
January	4*	134	July	1	39
February	3	113	August	2	62
March	3	120	September	2	73
April	2	73	October	3	98
May	2	59	November	3	108
June	1	28	December	1*	102
TOTAL	27	1009mm	* = The number of working days lost allows for the annual statutory Construction holiday in December and January of each year.		

5.13.1 The **penalty for delay** in failing to complete the Works is **R 40 000.00** (per Day).

5.14.1 The **requirements for achieving Practical Completion** will be determined by the Employer's Agent (in consultation with the Employer) and recorded in the minutes of the first Site Meeting / Handover Meeting. (Refer to 1.1.1.24 for a generic definition.) The requirements are to be regularly reviewed with respect to any variations to the Contract.

5.16.3 The **latent defect liability** period is **1 Years**.

6.2.1 **Security (Performance Guarantee)**: Delete the word “selected” and replace it with “stated”.

The liability of the Performance Guarantee shall be as per the following table:

<b>Value of Contract (incl. VAT)</b>	<b>Performance Guarantee Required</b>
Less than or equal to R 1m	Nil
Greater than R 1m and less than or equal to R 10m	5% of the Contract Sum
Greater than R 10m	10% of the Contract Sum

- 6.5.1.2.3 The **percentage allowance** to cover overhead charges for daywork are as follows:
- **30%** of the gross remuneration of workmen and foremen actually engaged in the daywork;
  - **15%** on the net cost of materials actually used in the completed work.
  - **10%** on the net cost of plant actually used in the completed work.

No allowance will be made for work done, or for materials and equipment for which daywork rates have been quoted at tender stage.

- 6.8.2 **Contract Price Adjustment Factor:** The value of the certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule (GCC 2015 - page 86) with the following Indices / Descriptions / Coefficients:

- The proportion not subject to adjustment: **x = 0.10**.
- The base month will be the month prior to the month in which tenders close.
- The Index for, **Plant, Materials, and Fuel** shall be based on **2023 = 100**.
- The Index for **Labour** shall be based on **2021 = 100**.

	STATS SA Statistical Release	Table	Description	Coefficient
• "L" is the "Labour Index"	P0141	Table A	Geographic Indices; CPI per Province; Kwa-Zulu Natal	<b>a = 0.28</b>
• "P" is the • "Contractor's Equipment Index"	P0151.1	Table 4	Plant and Equipment	<b>b = 0.28</b>
• "M" is the "Materials Index"	P0151.1	Table 6	Civil Engineering Material (excluding bitumen)	<b>c = 0.38</b>
• "F" is the "Fuel Index"	P0142.1	Table 1	Coke, petroleum, chemical, rubber and plastic products; Coal and petroleum products; Diesel	<b>d = 0.06</b>

- 6.8.3 Price adjustments for **variation in the cost of the special material(s)** listed below, will be allowed.

**Bitumen** - escalation will be calculated using the "Rise and Fall" method as determined by the Employer. The base price for bitumen on this contract shall be the ruling price of 50/70 grade bitumen based on the "Shell Wholesale List Selling Price for Penetration Grade Bitumen", seven (7) days prior to the closing date of tenders.

- 6.10.1.5 The **percentage advance** on materials not yet built into the Permanent Works is **80%**.

- 6.10.3 **Retention Money:** Delete the word "selected".  
The percentage retention on the amounts due to the Contractor is 10%.  
There is no limit on the total amount of "retention money" withheld.  
Should the Contract Price exceed the Contract Sum, retention shall continue to be withheld at 10% of amounts due.  
Interest will not be paid on retention withheld by the Employer.

- 8.6.1.1.2 The **value of Plant and materials** supplied by the Employer to be included in the insurance sum: **R 0.00**.



- 8.6.1.1.3 The **amount to cover professional fees** for repairing damage and loss to be included in the insurance sum: **Not Required**.
- 8.6.1.2 **SASRIA Coupon Policy** for Special Risks to be issued in joint names of Council and Contractor for the full value of the works (including VAT).
- 8.6.1.3 The limit of indemnity for **liability insurance**: **R 30 000 000.00**.
- 8.6.1.4 **Ground Support Insurance**:
- Minimum amount for any one occurrence, unlimited as to the number of occurrences, against any claim for damages or loss caused by vibration and / or removal of lateral support: **R 10 000 000.00**.
  - Maximum first excess: **R 20 000.00**.
- 8.6.1.5 Furthermore, the insurance cover effected by the Contractor shall meet the following requirements:
- Third Party Insurance (Public Liability)**
- Minimum amount for any one occurrence, unlimited as to the number of occurrences, for the period of the contract, inclusive of the maintenance period: **R 30 000 000.00**.
  - Consequential loss to be covered by policy: **Yes**
  - Liability section of policy to be extended to cover blasting: **Nil**.
  - Maximum excess per claim or series of claims arising out of any one occurrence: **R25 000.00**.
- Principal's own surrounding Property Insurance**
- Minimum amount for any one occurrence unlimited as to the number of occurrences against any claim for damage which may occur to the Council's own surrounding property: **R7 500 000.00**.
  - Maximum first excess: **R 25 000.00**.
- Insurance of Works**
- Minimum amount for additional removal of debris (no damage): **R 5 000 000.00**.
  - Minimum amount for temporary storage of materials off site, excluding Contractor's own premises: **R 3 000 000.00**.
  - Minimum amount for transit of materials to site: **R 3 000 000.00**.
- 8.6.5 **Approval by Employer**: At the end of the sub-clause, add the following paragraph:
- "Except where otherwise provided in the Special Conditions of Contract, the insurance cover effected by the Contractor in terms of this clause shall not carry a first loss amount greater than those set out below:
- | Contract Price             | First Loss |
|----------------------------|------------|
| Less than R 100,000        | R 5,000    |
| R 100,000 to R 500,000     | R 10,000   |
| R 500,000 to R 1,000,000   | R 20,000   |
| R 1,000,000 to R 2,000,000 | R 30,000   |
| R 2,000,000 to R 4,000,000 | R 40,000   |
| Greater than R 4,000,000   | R 50,000   |
- The insurance policy shall contain a specific provision whereby cancellation of the policy prior to the end of the period referred to in Cause 8.2.1 cannot take place without the prior written approval of the Employer."

10.1 **Contractor's claim**

10.1.4 Contractor's failure to comply with notice period

Insert the following words in the 3rd line after "Clause 10.1.2":

"or the Contractor fails to comply with the requirements of Clause 10.1.1.3".

10.5.1 **Dispute resolution** shall be by ad-hoc adjudication.

10.5.3 The **number of members** of the Adjudication Board to be appointed: **1**.

10.7.1 Failing ad-hoc adjudication, the determination of disputes shall be by arbitration.

**C1.2.2.2 DATA TO BE PROVIDED BY CONTRACTOR**

1.1.1.9 The legal name of Contractor is:

.....

.....

.....

.....

1.2.1.2 The Physical address of the Contractor is:

.....

.....

.....

The Postal address of the Contractor is:

.....

.....

.....

.....

The contact numbers of the Contractor are:

Telephone: .....

Fax: .....

The E-Mail address of the Contractor is:

.....

6.5.1.2.3 The **percentage allowance** to cover overhead charges for daywork are as follows:

- % of the gross remuneration of workmen and foremen actually engaged ..... %  
in the daywork;
- % on the net cost of materials actually used in the completed work. .... %

### C1.2.3 ADDITIONAL CONDITIONS OF CONTRACT

#### C1.2.3.1 COMMUNITY LIAISON OFFICER

The Ward Councillor(s) in whose ward(s) work is to be done will, collectively, identify a community liaison officer (CLO) for the project and make the person known to the Contractor within two days of being requested to do so. The Contractor will be required to enter a written contract with the CLO that specifies:

- The hours of work and the wage rate of the CLO (200% of the Civil Engineering Industry minimum wage).
- The duration of the appointment.
- The duties to be undertaken by the CLO which could include:
  - Assisting in all respects relating to the recruitment of local labour.
  - Acting as a source of information for the community and councillors on issues related to the contract.
  - Keeping the Contractor advised on community issues and issues pertaining to local security.
  - Assisting in setting up any meetings or negotiations with affected parties.
  - Keeping a written record of any labour or community issue that may arise.
  - Any other duties that may be required by the Contractor.

Responsibility for the identification of a pool of suitable labour shall rest with the CLO, although the Contractor shall have the right to choose from that pool. The Contractor shall have the right to determine the total number labourers required at any one time and this may vary during the contract.

The Contractor shall have the right to replace labour that is not performing adequately. Should such occasion arise, it must be done in conjunction with the CLO.

Payment: The CLO will be reimbursed from the PC Sum item in the Preliminary & General Section of the Bill of Quantities.

#### C1.2.3.2 EMPLOYMENT OF LOCAL LABOUR

It is a condition of contract that the contractor will be required to employ local labour as specified in eThekweni Council Policy "The use of CLOs and Local Labour". The contractor will be required to ensure that a minimum of 50% of the labour force is made up of local labour. For the purposes of this contract, "Local labour" will be deemed to be any **persons who reside within Ward 62**. The contractor will be required to provide proof of authenticity of local labour. Signed confirmation by the appointed CLO will suffice for this.

No additional costs will be entertained due to this Particular Specification. The contractor will remain responsible for providing proper supervision of all labour and will be responsible for the quality of work produced.

### C1.2.3.3 CONTRACTOR PARTICIPATION GOAL (CPG)

#### Objective

The objective of eThekweni Water & Sanitation empowerment initiative is to bring about meaningful transformation in all procurement projects and in particular in the built environment through the following:

- Meaningful Economic Participation;
- Local Economic Development;
- Transfer of Technical, Management and Entrepreneurial Skills; and
- Creation of sustainable Black Enterprises

#### Contract Participation Goals

Contract Participation Goal (CPG) – the **final** amount of services paid to CPG Partner/s based on the **final** Contract price

At the time of awarding the Contract, the **30%** minimum CPG amount will be based on the Contract Sum exclusive of the following:

- VAT, CPA and Contingencies

During Contract implementation, adjustments relating to Provisional Sums and Contingencies linked to the CPG allocation will be agreed upon between the parties to the Contract, as and when the need arises.

Tenderers are required to achieve at least 30% Contract Participation Goals (CPG) of the value of goods, services and Works paid to one or more targeted enterprises to comply with eThekweni Municipality BBBEE policy initiative.

- 30% includes any special materials.
- 30% excludes VAT, CPA and Contingencies.
- 30% excludes all provisional sum items.
- The tenderer will be required to achieve the actual Rand value committed for the CPG, adjusted according to the following:
  - o Variation Orders- Each VO will be evaluated by the Employer's Agent and the Project Manager to determine whether it should be counted, in its entirety or partially, as part of CPG or not.
  - o Re-measurable items (including CPA and provisional sums) Each re-measurable item change will be evaluated by the Employer's agent and Project Manager to determine whether it should be counted as part of CPG or not.

Within 2 weeks of the award of the Contract, the tenderer will be required to submit a cash flow projection for the main contractor and the CPG partner/s as well as a CPG implementation plan.

#### Applicability

The CPG target shall be achieved through the following mechanisms:-

- The main Contractor may propose a suitable targeted enterprise or CPG partner/s provided there is a statement of no objection from eThekweni Water & Sanitation.
- Sub-contracting of the CPG Partner/s at the same rate/ prices that the tenderer would have offered eThekweni Water & Sanitation whilst making profit margins consistent to the profit margins that the main contractor would have made under normal trading processes.
- The working capital arrangements between the main contractor and the CPG Partner/s must be agreed upon between the two parties prior to commencement of works to ensure that the CPG Partner does not have cash flow challenges during contract implementation.
- Value of the work to be sub contracted shall be at least 30% (minimum) of the total contract price excluding VAT.

Targeted Enterprise			
Annual Turnover	Black Ownership	Tax Clearance Certificate	CPG Target
TE< R15 m	>51%	Required	30% min.

#### **Monitoring and Reporting on CPG**

- For each monthly invoice submitted by the Main Contractor, the Targeted Enterprise(s) costs per function must be clearly articulated to enable the CPG targets to be easily and regularly monitored.
- eThekweni Water & Sanitation will monitor CPG implementation onsite. This may include direct contact with the CPG Partner/s on site for verification purposes.
- The CPG Partner shall be in agreement with the measurement and payment for work completed, for the purpose of submitting payment certificates, as determined by the Contractor.
- CPG Partner/s shall attend all contractual meetings relevant to their scope of work including contract award negotiations, monthly contract site meetings and technical meeting.

The Main Contractor must withhold retention of the Targeted Enterprise(s) fees until practical completion.

The Main Contractor must pay the amount due to the Targeted Enterprise within 3 days of receiving payment from the Employer.

#### **Eligibility Criteria for Targeted Enterprise**

- SARS registration and tax clearance
- Company registration
- Must be >51% Black-owned

#### **Black Owned**

- Black people who hold at least 51% of the exercisable voting rights
- Black people who hold at least 51% of the economic interest

#### **Penalties for not achieving the minimum CPG**

In the case where the minimum CPG value of 30% is not achieved. The Main Contractor will be penalized as follows:

No.	CPG not achieved in contract	Penalty Factor	Application	Objective
1	1 – 30%	0.5	For every percentage CPG not achieved; the CPG amount not achieved in Rands will be multiplied by the corresponding penalty factor. The factored amount in Rands will be deducted from the Main Contractor's Payment Certificates.	The Main Contractor is to support and mentor the Targeted Enterprise(s) to achieve the project milestones as part of the objectives to transfer Technical, Management and Entrepreneurial skills.

**C1.2.3.4 FTE (Full Time Equivalent) EMPLOYMENT INFORMATION**

It is a condition of contract that the Contractor supplies the Employer's Agent's Representative with information in respect of the employment of all foremen, artisans and labour (skilled and unskilled) employed to work on this contract. The information required is:

- Initials (per ID doc)
- Last Name (per ID doc)
- ID Number
- Disability (y / n)
- Education Level

<b>Level 1</b> Unknown	<b>Level 2</b> No Schooling	<b>Level 3</b> Grade 1-3	<b>Level 4</b> Grade 4	<b>Level 5</b> Grade 5-6
<b>Level 6</b> Grade 7-8	<b>Level 7</b> Grade 9	<b>Level 8</b> Grade 10-11	<b>Level 9</b> Grade 12	<b>Level 10</b> Post Matric

- Category of Employment

<b>Category A:</b> Employed as Local Labour for this contract only <b>Category B:</b> Temporarily employed by the Contractor <b>Category C:</b> Permanently employed by the Contractor
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In addition, the following information is required in respect of each person listed above, on a monthly basis:

- Number of days worked during the month;
- Daily wage rate;
- Number of training days during the month.

The information is to be forwarded in a format acceptable to the Employer's Agent's Representative, but preferably in the form of an emailed EXCEL file (an original file, to be used as a template, will be issued to the Contractor). Contractors without computer facilities will be required to submit a hard copy of the information in a format as agreed to between the Contractor and the Employer's Agent's Representative.

In addition to the tax invoice, to be submitted by the Contractor with his monthly statement, mentioned in Clause 6.10.4 of GCC 2015, the Employer reserves the right to withhold payment until the monthly FTE information has been forwarded to the Employer's Agent's Representative. No additional payment for complying with the above will be made and the Contractor is to make allowance for complying through the time related P & G items (sum) under Part AA: Preliminaries, of the Bill of Quantities.

**C1.2.3.5 PERFORMANCE MONITORING OF SERVICE PROVIDERS**

[For contract awards over R10m] The Contractor shall be subjected to "Performance Monitoring" assessments in terms of the applicable Section (S.53) of the Employer's Supply Chain Management Policy.

Key Performance Indicators (KPIs) are specified in the C3: Scope of Works, or will be discussed and agreed with the Contractor before commencement of the contract.

**C1.2.3.6 EXCEPTED RISKS (Clause 8.3)**

Pursuant to Clause 8.3 of the Conditions of Contract (GCC 2015), the Employer shall not be liable for the payment of standing time costs as a result of the occurrence of any of the "Excepted Risks" as defined under Clause 8.3.

However, the Employer shall reimburse the Contractor in respect of plant de-establishment and re-establishment costs as a result of "Excepted risks" when a written instruction to de-establish is issued to the Contractor.

**C1.2.3.7 SHUTS CANCELLED/ABORTED BY CONTRACTOR**

The Contractor is required to provide 7 days notice to the Employers Agent prior to any postponement or cancellation of the shutdown for any reason within the Contractors control. The penalty for failure to notify the Employer's Agent of any cancellation or postponement 7 days prior to any planned shutdown is R10 000.00.



## **C2.1: PRICING ASSUMPTIONS / INSTRUCTIONS**

### **C2.1.1 GENERAL**

The Bill of Quantities forms part of the Contract Documents and must be read and priced in conjunction with all the other documents comprising the Contract Documents (refer to F.1.2 of the Tender Data).

### **C2.1.2 PRICING INSTRUCTIONS AND DESCRIPTION OF ITEMS IN THE SCHEDULE**

Measurement and payment shall be in accordance with the relevant provisions of **Clause 8 of each of the Standard Engineering Specifications** referred to in the Scope of Work. The Preliminary and General items shall be measured in accordance with the provisions of **C2.1.8**.

The descriptions of the items in the Bill of Quantities are for identification purposes only and comply generally with those in the Standard Engineering Specification.

**Clause 8 of each Standard Engineering Specification**, read together with the relevant clauses of the Scope of the works, set out what ancillary or associated work and activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standard Engineering Specification, or the Scope of the works, conflict with the Bill of Quantities, the requirements of the Standard Engineering Specification or Scope of the work, as applicable, shall prevail.

### **C2.1.3 QUANTITIES REFLECTED IN THE SCHEDULE**

The quantities given in the Bill of Quantities are estimates only, and subject to re-measuring during the execution of the work. The Contractor shall obtain the Employer's Agent's detailed instructions for all work before ordering any materials or executing work or making arrangements for it.

The Works as finally completed in accordance with the Contract shall be measured and paid for as specified in the Bill of Quantities and in accordance with the General and Special Conditions of Contract, the Specifications and Project Specifications and the Drawings. Unless otherwise stated, items are measured

net in accordance with the Drawings, and no allowance has been made for waste.

The validity of the contract will in no way be affected by differences between the quantities in the Bill of Quantities and the quantities finally certified for payment.

### **C2.1.5 MONTHLY PAYMENTS**

Unless otherwise specified in the Specifications and Project Specifications, progress payments in Interim Certificates, referred to in **Clause 6.10.1 of the General Conditions of Contract**, in respect of "sum" items in the Bill of Quantities shall be by means of interim progress instalments assessed by the Employer's Agent and based on the measure in which the work actually carried out relates to the extent of the work to be done by the Contractor.

### **C2.1.4 PROVISIONAL SUMS / PRIME COST SUMS**

Where Provisional Sums or Prime Cost sums (PC Sum) are provided for items in the Bill of Quantities, payment for the work done under such items will be made in accordance with **Clause 6.6 of the General Conditions of Contract**. The Employer reserves the right, during the execution of the works, to adjust the stated amounts upwards or downwards according to the work actually done under the item, or the item may be omitted altogether, without affecting the validity of the Contract.

The Tenderer shall not under any circumstances whatsoever delete or amend any of the sums inserted in the "Amount" column of the Bill of Quantities and in the Summary of the Bill of Quantities unless ordered or authorized in writing by the Employer before closure of tenders. Any unauthorized changes made by the Tenderer to provisional items in the schedule, or to the provisional percentages and sums in the Summary of the Bill of Quantities, will be treated as arithmetical errors.

### **C2.1.6 PRICING OF THE BILL OF QUANTITIES**

The prices and rates to be inserted by the Tenderer in the Bill of Quantities shall be the full inclusive prices to be paid by the Employer for the work described under

the several items, and shall include full compensation for all costs and expenses that may be required in and for the completion and maintenance during the defects liability period of all the work described and as shown on the drawings as well as all overheads, profits, incidentals and the cost of all general risks, liabilities and obligations set forth or implied in the documents on which the Tender is based.

Each item shall be priced and extended to the "Total" column by the Tenderer, with the exception of the items for which only rates are required (Rate Only), or items which already have Prime Cost or Provisional Sums affixed thereto. If the Contractor omits to price any items in the Bill of Quantities, then these items will be considered to have a nil rate or price.

All items for which terminology such as "inclusive" or "not applicable" have been added by the Tenderer will be regarded as having a nil rate which shall be valid irrespective of any change in quantities during the execution of the Contract.

All rates and amounts quoted in the Bill of Quantities shall be in Rands and Cents and shall include all levies and taxes (other than VAT). VAT will be added in the Summary of the Bill of Quantities.

#### **C2.1.7 "RATE ONLY" ITEMS**

The Tenderer shall fill in rates for all items where the words "Rate Only" appear in the "Total" column. "Rate Only" items have been included where:

- (a) an alternative item or material is contemplated;
- (b) variations of specified components in the make-up of a pay item may be expected; and
- (c) no work under the item is foreseen at tender stage but the possibility that such work may be required is not excluded.

For "Rate Only" items no quantities are given in the "Quantity" column but the quoted rate shall apply in the event of work under this item being required. The Tenderer shall however note that in terms of the

Tender Data the Tenderer may be asked to reconsider any such rates which the Employer may regard as unbalanced.

#### **C2.1.8 PRELIMINARY AND GENERAL**

The Preliminary and General Section is provided to cover the Contractor's expenses incurred in complying with the requirements of the tender documents and consists of the following parts:

- Part AA: Preliminaries
- Part AB: General Specifications
- Part AH: Occupational Health and Safety

**Fixed Charge Items:** Each item should be priced separately and, subject to the Engineer certifying in terms of **Clause 6.7 of the General Conditions of Contract** that the work has been done, payment will be made as follows:

- (i) the total amount due when the certified value fixed charge items in this section is less than 5% of the net contract price;
- (ii) when the certified value of fixed charge items in this section is greater than 5% of the net contract price, payment will be limited to 5% of the net contract price. The remainder will be paid when the value of the work done under the contract, excluding the value of fixed charge items in this section, is greater than 50% of the net contract price, excluding the value of fixed charge items in this section.

**Time Related Items:** Any Time Related items not priced shall be deemed to be covered by the prices of other items in the section.

Payment of Time Related items in this section will be made throughout the contract period, the amount per month being the value of the item divided by the completion in months or, if specified in weeks, the equivalent number of months, in terms of **Clause 5.5 of the General Conditions of Contract**. The final monthly increment will only be paid upon the issue of a completion certificate.

## **C2.2: BILL OF QUANTITIES**

The Bill of Quantities follows.

**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.1: FIXED CHARGED ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
1.1	SABS 1200 A	<b>PRELIMINARY AND GENERAL FIXED CHARGED ITEMS</b>				
1.1.1	8.3.1	<b>CONTRACTUAL REQUIREMENTS</b>				
1.1.1.1	8.3.1	Contractual Requirements for the duration of the Contract	Sum	1.00		
1.1.2	8.3.2.1	<b>ESTABLISH FACILITIES ON THE SITE (SABS 1200 AB):</b>				
1.1.2.1	8.3.2.1 (a) PSAB 3.2	Furnished office building for Engineer & Employer including parking (2 No.)	Sum	1.00		
1.1.2.2	8.3.2.1 (b) PSAB 4.1	Airtime and wireless internet facilities for Engineer and Employer	Sum	1.00		
1.1.2.3	PSAB 3.2	Meeting room facilities.	Sum	1.00		
1.1.2.4	8.3.2.1 (c) PSAB 3.1	Project name board (2 No.) Refer to C4.3 for details	Sum	1.00		
1.1.2.5	PS 3.6.5.3	Ablution facilities for Engineer and Employer	Sum	1.00		
1.1.2.6	PSAB3.3	Temporary Offices for Employers Personnel	Sum	1.00		
1.1.3	8.3.2.2	<b>ESTABLISH FACILITIES ON THE SITE FOR CONTRACTOR:</b>				
1.1.3.1	8.3.2.2 (a)	Offices & storage sheds	Sum	1.00		
1.1.3.2	8.3.2.2 (e)	Ablution & latrine facilities	Sum	1.00		
1.1.3.3	8.3.2.2 (f)	Tools & equipment	Sum	1.00		
1.1.3.4	8.3.2.2 (g) PS 3.6	Water supplies, electric power and communications	Sum	1.00		
1.1.3.5	8.3.2.2 (h) PS 4.7 PSA 8.8	Dealing with water	Sum	1.00		
1.1.3.6	8.3.2.2 (i)	Access	Sum	1.00		
1.1.3.7	8.3.4	Removal of site establishment	Sum	1.00		
1.1.3.8	PSA 8.3.5	De-establishment of site (provisional quantity)	No.	2.00		
1.1.3.9	PSA 8.3.6	Re-establishment on site (provisional quantity)	No.	2.00		
1.1.3.10	PEM, PS4.12	Environmental Management Plan Obligations	Sum	1.00		
1.1.3.11	PS 4.13	Site security for the duration of the contract	Sum	1.00		

Total Carried Forward	
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**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.1: FIXED CHARGED ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.1.4	PSOH, PS4.21	<b>OCCUPATIONAL HEALTH &amp; SAFETY</b>				
1.1.4.1		General safety (Fixed Charges)	Sum	1.00		
1.1.4.2		Health & safety plan	Sum	1.00		
1.1.4.3		Contractors responsibility in terms of Quality Assurance, Construction Records and Construction Dossier	Sum	1.00		
1.1.5		<b>ALLOW FOR THE FOLLOWING ADDITIONAL ITEMS WHICH THE TENDERER REQUIRES TO BE PRICED SEPARATELY</b>				
		<u>Note: A breakdown to be attached for each additional item</u>				
1.1.5.1		a)	Sum	1.00		
1.1.5.2		b)	Sum	1.00		
1.1.5.3		c)	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.2: TIME RELATED ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
1.2	SABS 1200 A	<b>PRELIMINARY AND GENERAL TIME RELATED ITEMS</b> <u>Operation and maintenance of facilities on site, for duration of construction, except where otherwise stated:</u>				
1.2.1		<b>CONTRACTUAL REQUIREMENTS</b>				
1.2.1.1	8.4.1	Contractual Requirements for the duration of the Contract	Sum	1.00		
1.2.2	8.4.2.1	<b>FACILITIES FOR ENGINEER FOR DURATION OF CONSTRUCTION (SABS 1200 AB):</b>				
1.2.2.1	PSAB 3.2 8.4.2.1(a)	Furnished offices for Engineer and Employer including parking (2 No.)	Sum	1.00		
1.2.2.2	8.4.2.1(b) PSAB 4.1	Airtime and wireless internet for Engineer and Employer	Sum	1.00		
1.2.2.3	PSAB 3.2	Meeting room facilities	Sum	1.00		
1.2.2.4	PS3.6.5.3	Ablution facilities for Engineer and Employer	Sum	1.00		
1.2.2.5	PSAB3.3	Temporary Offices for Employers Personnel	Sum	1.00		
1.2.3	8.4.2.2	<b>FACILITIES FOR CONTRACTOR FOR DURATION OF CONSTRUCTION:</b>				
1.2.3.1	8.4.2.2 (a)	Offices & storage sheds	Sum	1.00		
1.2.3.2	8.4.2.2 (e)	Ablution & latrine facilities	Sum	1.00		
1.2.3.3	8.4.2.2 (f)	Tools & equipment	Sum	1.00		
1.2.3.4	8.4.2.2 (g) PS3.6	Water supplies, electric power and communications	Sum	1.00		
1.2.3.5	8.4.2.2 (h) PSA 8.8	Dealing with water	Sum	1.00		
1.2.3.6	8.4.2.2 (i)	Access	Sum	1.00		
1.2.3.7	8.4.3 PS 4 PS 4.14	Supervision for the duration of the Contract	Sum	1.00		
1.2.3.8	8.4.4	Company and head office overhead costs for the duration of the Contract	Sum	1.00		
1.2.3.9	PS4.12 PEM	Environmental Management Plan Obligations	Sum	1.00		
Total Carried Forward						

**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.2: TIME RELATED ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.2.3.10	PS4.13	Site security for the duration of the contract	Sum	1.00		
1.2.3.11		Communication and Public Relations	Sum	1.00		
	8.4.5	<u>Other time-related obligations</u> <u>(Contractor to Specify)</u>				
1.2.3.12		a)	Sum	1.00		
1.2.3.13		b)	Sum	1.00		
1.2.3.14		c)	Sum	1.00		
1.2.4	PSOH PS4.21	<b>OCCUPATIONAL HEALTH &amp; SAFETY</b>				
1.2.4.1		General Safety (Time Related)	Sum	1.00		
1.2.4.2		Training (time related) - Duration of training and detail of training to be specified	Sum	1.00		
1.2.4.3		Contractors responsibility in terms of quality control and quality assurance, including method statements	Sum	1.00		
Total Carried Forward To Summary						



**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.3: OTHER PRELIMINARY AND GENERAL ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
1.3		<b>OTHER PRELIMINARY AND GENERAL ITEMS</b>				
1.3.1	8.8	<b>TEMPORARY WORKS</b>				
1.3.1.1		Deal with traffic and maintain existing roads	Sum	1.00		
1.3.1.2	8.8.2 SANS1921	Accommodation of traffic for construction vehicles entering and leaving the construction site	Sum	1.00		
1.3.1.3	8.8.4 (c)	Excavation by hand in soft material to expose suspected but unknown existing services.	m³	30.00		
1.3.1.4	PS 4.22	Access to Site and access road for the entire duration of the Contract	Sum	1.00		
1.3.2	PS 4.11.5 PS 4.11	<b>AS-BUILTS AND DOCUMENTATION</b>				
		<u>As-Built Survey, for:</u>				
1.3.2.1		All pipelines and ancillary works	Sum	1.00		
1.3.2.2		Process units, chambers, channels, concrete structures, brickwork structures, pipework, valves, fittings and telemetry room, including cables, conduits, manholes and other electrical equipment installed under the Contract.	Sum	1.00		
1.3.2.3		Provision of full set of dimensioned marked up Record Drawings in A0 Hardcopy and Electronic PDF format	Sum	1.00		
1.3.3		<b>PRODUCTION OF A FULL SET OF ASBUILT DRAWINGS</b>				
1.3.3.1		Asbuilt drawings of the entire Treatment Works site (Civil, Structural, Mechanical, Electrical, Instrumentation). This includes all applicable process units and structures/buildings on site. Including a consolidated and federated Revit Model of the entire works.	Sum	1.00		
1.3.4	PSCOM	<b>TRIAL OPERATIONAL PERIOD</b>				
1.3.4.1	PSCOM 7	Contractors Responsibility in terms of the Trial Operational Period	Sum	1.00		
1.3.5		<b>CONDITIONAL ASSESSMENTS</b>				
Total Carried Forward						

**SCHEDULE 1 - PRELIMINARY AND GENERAL****SECTION 1.3: OTHER PRELIMINARY AND GENERAL ITEMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.3.5.1		Contractors Assessment of the entire site and compilation of structural defects and applicable remedial works	Sum	1.00		
1.3.6		<b>EXPERIENTIAL TRAINING</b>				
1.3.6.1	PS4.20	Experiential training - local students	Sum	1.00		
1.3.7		<b>EQUIPMENT APPROVALS</b>				
1.3.7.1	PS1.4	Submission of associated documentation within 30 days of commencement of the Contract. Including monthly updates to the documentation	Sum	1.00		
1.3.8		<b>HAZOP</b>				
1.3.8.1		HAZOP covering all scope of works within this Contract (Inclusive of the submission of HAZOP report & remedial works)	Sum	1.00		
1.3.9		<b>SHUTDOWNS/TIE-INS</b>				
1.3.9.1	PS4.4.8	Associated works for all shutdowns including the removal of sufficient existing pipe/structure to make way for new works, arranging shut-downs with eThekweni Municipality, cleaning and preparing the works for cutting, removal of blank flanges, dealing with all water (including that from leaking valves), preparing pipe ends for jointing, re-commissioning the pipeline/system and making good on site including all temporary supports. Inclusive of temporary supply systems to ensure the works remains operational. Note: Item to cover all planned shuts on the system for tie-ins	Sum	1.00		
		<b>APPOINTMENT OF A PROCESS ENGINEER</b>				
		Appointment of a Professionally Registered Process Engineer. Responsibilities include process design support, performance monitoring, troubleshooting for all works undertaken on this contract	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 1 - PRELIMINARY AND GENERAL****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
1.1	SECTION 1.1: FIXED CHARGED ITEMS	
1.2	SECTION 1.2: TIME RELATED ITEMS	
1.3	SECTION 1.3: OTHER PRELIMINARY AND GENERAL ITEMS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 2 - PROVISIONAL SUMS****SECTION 2.1: PROVISIONAL SUMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
2.1	8.5	<b>SUMS STATED PROVISIONALLY BY EMPLOYERS AGENT</b>				
2.1.1		Provisional sum for concrete cube strength and durability tests ordered by the Employer's Agent	Prov Sum	1.00	100,000.00	100,000.00
2.1.2		Overheads, charges and profit on above item	%	100,000.00		
2.1.3		Provisional Sum for non destructive testing of steel pipelines	Prov Sum	1.00	100,000.00	100,000.00
2.1.4		Overheads, charges and profit on above item	%	100,000.00		
2.1.5	PS4.23, PCL	Provisional sum for employment CLO.	Prov Sum	1.00	500,000.00	500,000.00
2.1.6		Overheads, charges and profit on above item	%	500,000.00		
2.1.7	PS4.11.4	Provisional sum for progress photographs/photographic record including drone imagery	Prov Sum	1.00	35,000.00	35,000.00
2.1.8		Overheads, charges and profit on above item	%	35,000.00		
2.1.9		Provisional sum for equipment for Employer's Agent as directed	Prov Sum	1.00	50,000.00	50,000.00
2.1.10		Overheads, charges and profit on above item	%	50,000.00		
2.1.11	PSD 8.3.7	Additional lateral support where ordered by the Engineer (provisional)	Prov Sum	1.00	250,000.00	250,000.00
2.1.12		Overheads, charges and profit on above item	%	250,000.00		
2.1.13		Provisional sum for additional specialised Engineering services as directed by the Employers Agent	Prov Sum	1.00	500,000.00	500,000.00
2.1.14		Overheads, charges and profit on above item	%	500,000.00		
2.1.15		Provisional sum for additional surveying as directed by the Employer's Agent	Prov Sum	1.00	75,000.00	75,000.00
2.1.16		Overheads, charges and profit on above item	%	75,000.00		
2.1.17		Provisional sum for a weather station	Prov Sum	1.00	25,000.00	25,000.00
Total Carried Forward						

**SCHEDULE 2 - PROVISIONAL SUMS****SECTION 2.1: PROVISIONAL SUMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
2.1.18	PSCLR	Overheads, charges and profit on above item	%	25,000.00		
2.1.19		Provisional Sum for ancillary civil and structural remedial works	Prov Sum	1.00	500,000.00	500,000.00
2.1.20		Overheads, charges and profit on above item	%	500,000.00		
2.1.21		Provisional Sum for ancillary mechanical, electrical and instrumentation remedial works/equipment	Prov Sum	1.00	500,000.00	500,000.00
2.1.22		Overheads, charges and profit on above item	%	500,000.00		
2.1.23		Provisional sum for additional geotechnical investigations / monitoring	Prov Sum	1.00	150,000.00	150,000.00
2.1.24		Overheads, charges and profit on above item	%	150,000.00		
2.1.25		Provisional Sum for colour coding painting of pipework	Prov Sum	1.00	200,000.00	200,000.00
2.1.26		Overheads, charges and profit on above item	%	200,000.00		
2.1.27		Provisional Sum for lock out boards	Prov Sum	1.00	25,000.00	25,000.00
2.1.28		Overheads, charges and profit on above item	%	25,000.00		
2.1.29		Provisional Sum for ISD Consultant	Prov Sum	1.00	800,000.00	800,000.00
2.1.30		Overheads, charges and profit on above item	%	800,000.00		
2.1.31		Provisional Sum for painting of walls, floors and ceilings as directed by the Engineer	Prov Sum	1.00	200,000.00	200,000.00
2.1.32		Overheads, charges and profit on above item	%	200,000.00		
2.1.33		Provisional Sum for Chlorine Building Extension	Prov Sum	1.00	200,000.00	200,000.00
2.1.34		Overheads, charges and profit on above item	%	200,000.00		
2.1.35	Provisional Sum for improvements to on site storage	Prov Sum	1.00	5,000,000.00	5,000,000.00	
Total Carried Forward						

SCHEDULE 2 - PROVISIONAL SUMS

SECTION 2.1: PROVISIONAL SUMS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
2.1.36		Overheads, charges and profit on above item	%	5,000,000.00		
Total Carried Forward To Summary						

**SCHEDULE 2 - PROVISIONAL SUMS****SECTION 2.2: DAYWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
2.2	SABS 1200A 8.7	<b>DAYWORKS</b>				
2.2.1		<b>LABOUR</b>				
2.2.1.1		Foreman	hr	30.00		
2.2.1.2		Semi-skilled	hr	50.00		
2.2.1.3		Unskilled	hr	200.00		
2.2.1.4		Surveyor with transport, instruments and labour	hr	40.00		
2.2.2		<b>PLANT</b>				
2.2.2.1		CAT 930 (75kW) or similar including establishment and de-establishment	hr	10.00		
2.2.2.2		Other (Contractor to specify)	hr	20.00		
		<u>Bulldozer with ripper:</u>				
2.2.2.3		CAT D8 or similar	hr	30.00		
		<u>Motor Grader:</u>				
2.2.2.4		110 kW	hr	30.00		
2.2.2.5		Other (Contractor to specify)	hr	20.00		
		<u>Tip Truck:</u>				
2.2.2.6		10m <sup>3</sup>	hr	50.00		
2.2.2.7		6m <sup>3</sup>	hr	50.00		
2.2.2.8		Other (Contractor to specify)	hr	20.00		
		<u>Backactor:</u>				
2.2.2.9		100kW, 23 ton	hr	50.00		
2.2.2.10		30 ton	hr	10.00		
2.2.2.11		TLB	hr	80.00		
2.2.2.12		Other (Contractor to specify)	hr	20.00		
		<u>Compactors:</u>				
2.2.2.13		Self propelled vibrating roller, 9 ton	hr	20.00		
2.2.2.14		Bomag 60 or similar	hr	20.00		
2.2.2.15		Plate compactor	hr	20.00		
2.2.2.16		Other (Contractor to specify)	hr	20.00		
Total Carried Forward						

**SCHEDULE 2 - PROVISIONAL SUMS****SECTION 2.2: DAYWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
2.2.2.17		Pneumatic Roller	hr	20.00		
		<u>Water Tankers:</u>				
2.2.2.18		Water Tanker 9000 litres	hr	100.00		
		<u>Self propelled Crane:</u>				
2.2.2.19		20 Tonne	hr	20.00		
2.2.2.20		Generator and Breaker 5KVA	hr	50.00		
2.2.2.21		Water/Sludge Pump 50mm	hr	10.00		
		<u>Welding Equipment:</u>				
2.2.2.22		Heavy duty, self powered welding machine 400A	hr	20.00		
2.2.2.23		Welder ( Coded) with assistant	hr	20.00		
		<u>Various Other:</u>				
2.2.2.24		Compressor 400 cuft/min - with 2 breakers	hr	30.00		
2.2.2.25		Electric breaker - single phase	day	5.00		
2.2.2.26		Angle Grinder - 230mm	day	5.00		
2.2.2.27		Pneumatic Hammer Drill - 1500Watt	day	5.00		
2.2.2.28		Concrete mixer - 360l capacity	day	5.00		
2.2.2.29		7 Tonne flat bed with mounted crane and driver	hr	10.00		
2.2.2.30		1 Tonne LDV with driver	km	200.00		
2.2.2.31		Tractor 30 kW or similar	hr	10.00		
2.2.2.32		3 Disk Plow	hr	10.00		
2.2.3		<b>MATERIALS</b>				
2.2.3.1		Sand (building)	m³	100.00		
2.2.3.2		Sand (river)	m³	50.00		
2.2.3.3		50kg pocket of Cement	No.	30.00		
2.2.3.4		Dump Rock 150mm	m³	10.00		
2.2.3.5		Crusher Run 28mm	m³	20.00		
2.2.3.6		G5 material	m³	20.00		
Total Carried Forward						



**SCHEDULE 2 - PROVISIONAL SUMS****SECTION 2.2: DAYWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
2.2.3.7		G2 material	m <sup>3</sup>	20.00		
2.2.3.8		Provisional sum for cost of other materials	Prov Sum	1.00	50,000.00	50,000.00
		<u>Other (To be specified by Contractor, a breakdown to be attached)</u>				
		a)				
		b)				
		c)				
Total Carried Forward To Summary						

**SCHEDULE 2 - PROVISIONAL SUMS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
2.1	SECTION 2.1: PROVISIONAL SUMS	
2.2	SECTION 2.2: DAYWORKS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
3.1		<b>SECTION 3: HEAD OF WORKS EARTHWORKS</b>				
3.1.1	SANS 1200D	EARTHWORKS				
3.1.1.1	8.3.3	Excavate by hand around existing Mixing structure and/or existing offtake to works to prove existing pipelines for proposed bypass	m <sup>3</sup>	10.00		
3.1.2	SANS 1200DB PSDB	EARTHWORKS (PIPE TRENCHES)				
3.1.2.1	8.3.5	Excavate by hand for proofing of existing Rising main	m <sup>3</sup>	30.00		
3.1.2.2	8.3.2 a	Remove topsoil to nominal depth of 150mm, stockpile and maintain	m <sup>2</sup>	60.00		
3.1.2.3	8.3.6	Topsoil from stockpile provided for under item 3.2.2	m <sup>2</sup>	60.00		
3.1.2.4	8.3.7	Supply and lay approved grassing as specified in the EMP	m <sup>2</sup>	60.00		
	8.3.2 PSDB	Excavate in all materials for pipe trench up to DN500 pipe, backfill, compact & dispose of surplus material for depths:  Over and up to:				
3.1.2.5		0.0 - 0.5m	m	5.00		
3.1.2.6		0.51 - 1.0m	m	50.00		
3.1.2.7		1.01 - 2m	m	10.00		
3.1.2.8	8.3.2	Extra over items 3.2.5 to 3.2.7 for excavation in hard rock	m <sup>3</sup>	5.00		
3.1.2.9	8.3.3.4(b)	Overhaul for spoil material under item 3.2.5 to 3.2.7 as instructed by the Engineer	m <sup>3</sup> .km	15.00		
3.1.2.10		Extra over items 3.2.1 to 3.2.3 for saw cutting of asphalt surface	m	80.00		
	8.3.5	Services that intersect or adjoin a trench				
3.1.2.11		a) Services that intersect a trench	No.	10.00		
3.1.2.12		b) Services that adjoin a trench	m	40.00		
3.1.3	SANS 1200M	<b>ROAD WORKS</b>				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.3.1	8.3.6.1	Re-instatement of road surfaces, including all layer works as detailed below: 40mm asphalt surfacing including tack coat	m <sup>2</sup>	50.00		
3.1.3.2	8.3.6.1	150mm thick G7 sub base compacted to 98% ModAASHO	m <sup>2</sup>	50.00		
3.1.3.3	8.3.6.1	150mm thick G7 sub base compacted to 95% ModAASHO	m <sup>2</sup>	50.00		
3.1.3.4		Compaction of pipe trenches in gravel road to 90% mod AASHTO	m <sup>3</sup>	35.00		
3.1.3.5		Replacement of kerbs to roadway including concrete support	m	70.00		
3.1.4		<b>BEDDING (PIPE)</b>  Selected granular material for Class C bedding and fill where ordered, obtained from:				
3.1.4.1	8.2.2.1	Trench excavations	m <sup>3</sup>	10.00		
3.1.4.2	8.2.2.3	Commercial sources	m <sup>3</sup>	90.00		
3.1.5	SANS 1200L PSL	<b>MEDIUM PRESSURE PIPELINES</b>  Note: The tendered prices for pipes, valves & specials to include for the cost of necessary couplings, sockets, or flange jointing material scarfing, cutting, welding, jointing and repairs to coatings and linings as necessary. This section allows provisional quantities, however final measurement will depend on agreed option for tie-in				
	8.2.1 PSL	Supply, lay, bed & test pipes complete with all field welds and repairs to coating and lining the following grade X42 Steel (Plain Ended, suitable for VJ) epoxy coated and lined pipes to specification, including the manufacture, coating, lining, repair, installation and testing complete of all bends up to 5 deg. :				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.5.1	8.2.5 PSL	DN400mm OD, 4,5mm wall thickness epoxy coated and lined X42 steel site run pipeline (VJ jointed) wrapped with 55% overlap 1250 micron Denso Ultraflex (or similar approved)	m	20.00		
3.1.5.2		DN400 VJ coupling to suit DN400mm OD 4,5mm X42 steel pipe, with central register, together with petromastic, petrolatum, and topping tape (or similar approved)	No.	8.00		
		Extra over item 3.5.1 for supplying, laying & bedding of the following DN400mm OD 4,5mm wall thickness steel coated and lined Grade X42 special bends and reducers to specification including welding and repairs to coatings and linings, all bends and reducers to include DN200 flanged stub complete with blank flange and ball valve and precast manhole as detailed for inspection purposes. All ends prepared for VJ coupling wrapped with 1250 micron Denso Ultraflex (or similar approved) at 55% overlap:				
3.1.5.3		>5° - 11¼° long radius bend	No.	2.00		
3.1.5.4		>11¼° - 22½° long radius bend	No.	1.00		
3.1.5.5		>22½° - 45° long radius bend	No.	2.00		
3.1.5.6		>45° - 90° long radius bend	No.	1.00		
3.1.5.7		DN500mm OD, 4,5mm wall thickness epoxy coated and lined X42 steel site run pipeline (VJ jointed) wrapped with 55% overlap 1250 micron Denso Ultraflex (or similar approved)	m	40.00		
3.1.5.8		DN500 VJ coupling to suit DN500mm OD 4,5mm X42 steel pipe, with central register, together with petromastic, petrolatum, and topping tape (or similar approved)	No.	10.00		
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
	8.2.5 PSL	Extra over item 3.5.7 for supplying, laying & bedding of the following DN500mm OD 4,5mm wall thickness steel coated and lined Grade X42 special bends and reducers to specification including welding and repairs to coatings and linings, all bends and reducers to include DN200 flanged stub complete with blank flange and ball valve and precast manhole as detailed for inspection purposes. All ends prepared for VJ coupling wrapped with 1250 micron Denso Ultraflex (or similar approved) at 55% overlap:				
3.1.5.9		>5° - 11¼° long radius bend	No.	3.00		
3.1.5.10		>11¼° - 22½° long radius bend	No.	1.00		
3.1.5.11		>22½° - 45° long radius bend	No.	1.00		
3.1.5.12		>45° - 90° long radius bend	No.	1.00		
		OFFTAKE (ISOLATION AND METER) CHAMBER AND ROAD CROSSING (Ref drawing 60398/38, 60398/39)				
3.1.6	SANS 1200D PSD	EARTHWORKS				
3.1.6.1	8.3.1.2	Remove topsoil to a normal depth of 150mm stockpile & maintain	m²	80.00		
3.1.6.2	8.3.3	Restricted excavation in all materials irrespective of depth for chambers	m³	100.00		
3.1.6.3	8.3.6	Overhaul for spoil material under item 3.6.1.1/2 as instructed by the Engineer	m³.km	20.00		
3.1.7	SANS 1200D PSD	FINISHES		160.00		
3.1.7.1	8.3.10	Topsoiling from stockpile under item 3.6.1.1	m²	70.00		
3.1.7.2	8.3.11	Supply and lay approved grass sodding as specified in the EMP	m²	70.00		
	SANS 1200G PSG	<b>CONCRETE WORKS (STRUCTURAL)</b>				
3.1.8	8.1.1	FORMWORK				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.8.1	8.2.2	Supply, install and remove upon completion all necessary formwork shutters, propping, scaffold support work, ledges, soldiers, keys, wedges and ferrels complete. Rate inclusive of boxing out for pipework and manholes.				
		Smooth vertical to chambers				
		Vertical wall surfaces to chambers	m <sup>2</sup>	70.00		
3.1.8.2	8.2.5	Narrow Widths to chambers not exceeding 250mm				
		External floor slab	m	16.00		
3.1.8.3		25 x 25mm extra over for chamfer to all exposed edges	m	15.00		
3.1.8.4	8.2.2	Smooth horizontal soffits to chambers including propped to:				
		Soffit for roof slab 2.4m	m <sup>2</sup>	10.00		
		Rough vertical to thrust blocks				
3.1.8.5	8.2.5	Side walls of thrust blocks	m <sup>2</sup>	10.00		
		Narrow widths to road crossing pipe protection slab				
3.1.8.6	8.2.5	Road crossing pipe protection slab (internal to 300mm width)	m	20.00		
3.1.8.7	8.2.5	Road crossing pipe protection slab (external to 150mm width)	m	20.00		
3.1.9	8.1.2	<b>REINFORCEMENT</b>				
3.1.9.1	8.3.1	High tensile steel reinforcement of all diameters between 8mm and 25mm in chamber floors, walls and roofs.	t	3.00		
3.1.9.2	8.3.1	MS reinforcement of all diameters between 8mm and 32mm	t	0.10		
3.1.9.3	8.3.2	Mesh ref 888	m <sup>2</sup>	50.00		
3.1.9.4		25mm galvanised round bar dowels 500mm long cast halfway into road protection slab (inner) and coated with debonding agent for outer slab (300 centres)	No.	90.00		
3.1.10	8.1.3	<b>CONCRETE</b>				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.10.1	PSG 5.5.3.2	Concrete Mix Designs	Sum	1.00		
3.1.10.2	8.4.2	Blinding layer 40mm thick in grade 15/19 concrete to chambers	m <sup>2</sup>	16.00		
	8.4.3	Grade 25/19 concrete in chambers				
3.1.10.3		Chamber	m <sup>3</sup>	17.00		
	8.4.3	Grade 25/19 concrete				
3.1.10.4		Road crossing pipe protection slab	m <sup>3</sup>	8.00		
	8.4.3	Grade 15/19 concrete				
3.1.10.5		For thrust blocks/anchor blocks/valve supports	m <sup>3</sup>	15.00		
3.1.11		UNFORMED SURFACE FINISHES				
	8.4.4 (b)	Steel float finish				
3.1.11.1		Chamber Floor Slabs	m <sup>2</sup>	9.00		
3.1.11.2		Chamber Roof Slabs	m <sup>2</sup>	12.00		
3.1.11.3		Road crossing pipe protection slab	m <sup>2</sup>	50.00		
3.1.12	PSG 5.5.8 PSG 8.4.7	CURING AND PROTECTION				
3.1.12.1		Wall slab	m <sup>2</sup>	70.00		
3.1.12.2		Floor and roof slabs	m <sup>2</sup>	21.00		
3.1.12.3		Road crossing slab	m <sup>2</sup>	50.00		
3.1.13	8.5	JOINTS				
3.1.13.1		Glassgrid to under asphalt at road crossing protection slab detail	m <sup>2</sup>	25.00		
3.1.13.2		Concrete debonding agent to inner road crossing protection slab sides	m <sup>2</sup>	8.00		
3.1.13.3		20mm polystyrene under road crossing protection slab	m <sup>2</sup>	7.00		
		OFFTAKE CHAMBER DN500/400 PIPELINE OPTIONS ANALYSIS AND DESIGN				
Total Carried Forward						



**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.13.4	SANS 1200A 8.5(a)	Provide the provisional sum for the implementation of final agreed inlet works configuration including tie into existing raw water line, site run pipe, and other materials and works deemed necessary not included elsewhere within the BOQ to the screening structure.	Prov Sum	1.00	750,000.00	750,000.00
3.1.13.5		Contractors markup on the above direct proven costs	%	750,000.00		
3.1.13.6		Contractor to present options (inclusive of preliminary cost estimates) , workshop and finalise design including implementation methodology for the final agreed inlet works configuration.	Sum	1.00		
3.1.14	SANS 1200L PSL	PIPE FITTINGS				
		Supply deliver, install to site the following fittings to test and commission. All pressure rating PN10 and all Flange Drilling to match existing. Rates to include necessary couplings, sockets, flange jointing material, cutting, welding, joining, lining, coating, and coating repair on site as necessary.:				
3.1.14.1		Item 1, DN500, PN10 Epoxy coated and lined flanged restrained VJ coupling	No	2.00		
3.1.14.2		Item 2, DN500, PN10 Epoxy coated and lined flanged pipe with puddle 1200mm long, 25mm stub, ball valve and pressure gauge	No	1.00		
3.1.14.3		Item 4, DN500/400, PN10 Epoxy coated and lined flanged/plain ended concentric reducer 2300mm long	No	1.00		
3.1.14.4		Item 5, DN400, PN10 Epoxy coated and lined flanged restrained VJ coupling	No	1.00		
3.1.14.5		Item 7, DN400/500, PN10 Epoxy coated and lined flanged reducer special with puddle 1700mm long.	No	1.00		
3.1.14.6		Item 8, DN80, PN10 Epoxy coated GMS flanged/plain ended pipe with puddle 400mm long.	No	1.00		
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)	
Brought Forward							
3.1.14.7	SANS 1200HA	Item 9, DN80, PN10 Epoxy coated GMS flange adaptor for HDPe	No	1.00			
3.1.14.8		DN500 Insulating flange as specified	No	2.00			
3.1.15		SUNDRY ITEMS					
3.1.15.1		GMS access ladder fabricated to details on drawings and fixed to internal wall of chamber. Overall length 2.4m	No.	2.00			
3.1.15.2		GMS hand grip fabricated to detail on drawing and cast into slab	No.	2.00			
3.1.15.3		GMS pipe brackets for DN400 pipes as detailed	No.	1.00			
3.1.15.4		GMS pipe brackets for DN500 pipes as detailed	No.	1.00			
		SANS 1200HA	GALVANISED/SS STEEL VENTILATORS				
3.1.15.5	Fabricate and install GMS ventilators to detail on drawings		No.	2.00			
3.1.16	MISCELLANEOUS ITEMS						
	SANS 1200A	MANHOLE COVER					
3.1.16.1		Supply and install into roof of chambers 1.8x0.9m GMS lockable manhole cover and frame complete as detailed on the drawings	No.	2.00			
3.1.17		PROVISIONAL SUM					
3.1.17.1	8.5(a)	Provide the Provisional Sum of R50 000 for signage and life saving equipment as instructed by the Engineer	Prov Sum	1.00			
3.1.17.2		Contractors markup on above	%	50,000.00			
	SANS 1200D PSD	FLOW CONTROL VALVE CHAMBER AND SCREEN (Ref Drawing 60398/37)					
3.1.18		EARTHWORKS					
3.1.18.1		8.3.1.2	Remove topsoil to a normal depth of 150mm stockpile & maintain	m²	90.00		
3.1.18.2		8.3.3	Restricted excavation in all materials irrespective of depth for chambers	m³	110.00		
Total Carried Forward							

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.18.3	8.3.6	Overhaul for spoil material under item 3.8.1.1/2 as instructed by the Engineer	m <sup>3</sup> .km	500.00		
3.1.19		FINISHES				
3.1.19.1	8.3.10	Topsoiling from stockpile under item 3.8.1.1	m <sup>2</sup>	60.00		
3.1.19.2	8.3.11	Supply and lay approved grassing as specified in the EMP	m <sup>2</sup>	60.00		
	SANS 1200G PSG	CONCRETE WORKS (STRUCTURAL)				
3.1.20	8.1.1	FORMWORK				
		Supply, install and remove upon completion all necessary formwork shutters, propping, scaffold support work, ledges, soldiers, keys, wedges and ferrels complete. Rate inclusive of boxing out for pipework and manholes.				
		Smooth vertical to chambers				
3.1.20.1	8.2.2	Vertical wall surfaces to chambers	m <sup>2</sup>	85.00		
		Narrow Widths to chambers not exceeding 250mm				
3.1.20.2	8.2.5	External floor slab	m	26.00		
3.1.20.3	8.2.2	25 x 25mm extra over for chamfer to all exposed edges	m	60.00		
		Smooth horizontal soffits to chambers including propped to:				
3.1.20.4		Soffit for roof slab 2.4m	m <sup>2</sup>	2.00		
3.1.21	8.1.2	REINFORCEMENT				
3.1.21.1	8.3.1	High tensile steel reinforcement of all diameters between 8mm and 25mm in chamber floors, walls and roofs.	t	5.00		
3.1.21.2		MS reinforcement of all diameters between 8mm and 32mm	t	0.10		
3.1.21.3	8.3.2	Mesh ref. 888	m <sup>2</sup>	5.00		
3.1.22	8.1.3	CONCRETE				
3.1.22.1	PSG 5.5.3.2	Concrete mix designs	Sum	1.00		
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.22.2	8.4.2	Blinding layer 50mm thick in grade 15/19 concrete to chambers	m <sup>2</sup>	35.00		
	8.4.3	Grade 30/19 concrete (min. cement content to be 350kg/m3) in chambers				
3.1.22.3		Chamber	m <sup>3</sup>	5.00		
3.1.22.4		Screening Structure incl. skip slab	m <sup>3</sup>	18.00		
3.1.23		UNFORMED SURFACE FINISHES				
	8.4.4 (b)	Steel float finish				
3.1.23.1		Chamber Floor Slabs	m <sup>2</sup>	2.00		
3.1.23.2		Chamber Roof Slabs	m <sup>2</sup>	4.00		
3.1.23.3		Screens Floor Slab	m <sup>2</sup>	20.00		
3.1.23.4		150mm Thick Reinforced Skip Floor Slab	m <sup>2</sup>	5.00		
3.1.24	PSG 5.5.8 PSG 8.4.7	CURING AND PROTECTION				
3.1.24.1		Walls and sides	m <sup>2</sup>	92.00		
3.1.24.2		Floor and roof slabs	m <sup>2</sup>	26.00		
3.1.24.3		Skip floor slab	m <sup>2</sup>	5.00		
3.1.25	SANS 1200L PSL	PIPE FITTING				
		Supply deliver, install, test and commission the following items. Rates to include necessary couplings, sockets, flange jointing material, cutting, welding, joining, lining, coating, and coating repair on site as necessary.:				
3.1.25.1		Item 1, DN500 PN10 Epoxy coated and lined flanged/plain ended pipe 1170mm long with puddle.	No	1.00		
3.1.25.2		Item 3, DN500 PN10 Epoxy coated and lined flanged VJ coupling.	No	1.00		
3.1.25.3		Item 4 , DN500 PN10 Epoxy coated and lined plain ended pipe 755mm long with puddle.	No	1.00		
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.25.4		Item 5, DN400 PN10 Epoxy coated and lined plain ended pipe 755mm long with puddle.(1No. for bypass installation to exist. Mixing structure)	No	2.00		
3.1.25.5		Item 6, DN500 PN10 Epoxy coated and lined plain ended pipe 550mm long with puddle.	No	2.00		
3.1.25.6		Item 7, DN100 PN10 GMS and epoxy coated flanged/plain ended pipe welded to DN400 bypass pipeline 380mm long.	No	2.00		
3.1.25.7		Item 8, DN100 PN10 GMS and epoxy coated flanged spool pipe 500mm long with puddle.	No	1.00		
3.1.25.8		Item 9, DN100 PN10 GMS and epoxy coated flanged/plain ended pipe 980mm long.	No	1.00		
3.1.25.9		Item 10, DN100 PN10 epoxy coated and lined VJ coupling.	No	1.00		
3.1.25.10		Item 11, DN100 PN10 epoxy coated and lined SGI resilient seal gate valve.	No	1.00		
3.1.25.11		Item 12, DN100 PN10 GMS and epoxy coated flanged 90° LR bend special with puddle 630mm long	No	1.00		
3.1.25.12		Item 13, DN100 PN10 GMS and epoxy coated flanged spool pipe 3860mm long.	No	1.00		
3.1.25.13		Item 14, DN100 PN10 GMS and epoxy coated flanged/plain ended 90° LR bend special with puddle 365mm long	No	1.00		
3.1.25.14		Item 15, DN80 PN10 Epoxy coated GMS flanged one end spool pipe with puddle 400mm long	No	1.00		
3.1.25.15		Item 16, DN80 PN10 Epoxy coated and lined flange adaptor for HDPE.	No	1.00		
3.1.25.16		DN75 HDPe pipe site run to daylight	m	15.00		
3.1.25.17		DN500 D75 concrete pipeline site run to headwall	m	50.00		
3.1.26	SANS 1200HA	SUNDRY ITEMS				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.26.1	8.3.2 (b)	GRP access ladder fabricated to details on drawings and fixed to internal wall of chamber. Overall length 2.4m	No.	1.00		
3.1.26.2		Supply, fabricate, deliver and install coated GMS ball type handrailing, Height & style to match existing. (including sloped as shown), complete.	m	30.00		
3.1.26.3		Swing gate to ball type handrailing as detailed	No.	2.00		
3.1.26.4		GMS pipe brackets for DN500 pipes as detailed	No.	1.00		
3.1.26.5		Supply, fabricate, deliver and install 40x40 GMS grating (40x3 bearer bar). Grating segments to be banded. Holes to manufactured for items such as hand railing stanchions, hand stop slits.	m <sup>2</sup>	3.50		
3.1.26.6		Supply, fabricate, deliver and install 50x50(x5mm) GMS support beam for grating, fixed to wall with galv. M12 chemical anchors at 300mm spacing	m	2.50		
3.1.26.7		Supply, fabricate, deliver and cast in 40x40(x3mm) GMS support bracket for grating, cast in with fishtails at 300mm centres.	m	5.00		
3.1.26.8		Galv. Skip skid 40kg/m rail steel section cast into proposed slab 2.5m long	No.	2.00		
3.1.27	SANS 1200G PSG	JOINTS				
3.1.27.1	8.5	200 x 2mm thick sikadur combiflex system or similar approved	m	25.00		
3.1.27.2	8.5	250 x 3mm thick plasticized PVC type control waterbar with clips to reinforcing	m	25.00		
3.1.27.3	8.5	"Sikaswell P" Extrudable Water swelling Profile joint sealing waterstop (Provisional)	m	5.00		
3.1.28		FIRE SAFETY				
3.1.28.1		Supply and install 5kg DCP fire extinguisher to wall, complete with weather cabinet and signage.	No.	1.00		
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.28.2		Supply and install 5kg CO2 fire extinguisher to wall, complete with weather cabinet and signage.	No.	1.00		
3.1.29		TESTING AND COMMISSIONING				
3.1.29.1	PSG 7.3.9	Testing of screening structure for water tightness in accordance with the specifications.	Sum	1.00		
3.1.30		GALVANISED/SS STEEL VENTILATORS				
3.1.30.1		Fabricate and install GMS ventilators to detail on drawings	No.	2.00		
3.1.31	SANS 1200HA	MISCELLANEOUS ITEMS				
3.1.31.1		Supply and install into roof of chambers 1.4x0.9m GMS lockable manhole cover and frame complete as detailed on the drawings	No.	1.00		
3.1.31.2		0.5 Tonne screen and handstop hoist as detailed	No.	1.00		
3.1.31.3		Provisional sum of R60000 for procurement of a Refuse Skip 3.5m³ or maintenance contract, period unspecified	Prov Sum	1.00		
3.1.31.4		Contractors markup on above	%	60,000.00		
3.1.32	SANS 1200A	PROVISIONAL SUM				
3.1.32.1	8.5 (a)	Provide the Provisional Sum of R25 000 for chamber signage and painting as instructed by the Engineer	Prov Sum	1.00		
3.1.32.2		Contractors markup on above	%	25,000.00		
3.1.33		<b>POLYMER TANK BUND (Ref Drawing 60398/41)</b>				
3.1.33.1		Clean out existing tanks and remove grating and other fixtures to stores / landfill as instructed.	No.	2.00		
3.1.33.2		Commercial bedding Sand fill compacted to 100% MOD AASHTO to existing polymer tank to required level.	m³	20.00		
3.1.34	SANS 1200G PSG	CONCRETE WORKS				
Total Carried Forward						

**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.34.1	8.5	Prepare Construction Joint (to new bund floor / wall interface) by removing outer concrete laitance (through needle punching or other approved method) and wetting for 24 hours before placing new concrete.	m <sup>2</sup>	6.00		
3.1.35	8.1.1	FORMWORK				
3.1.35.1	8.2.5	Smooth vertical to sump sides (125mm)	m	1.00		
3.1.35.2		Supply and lay 250 micron plastic sheeting to underside of new concrete slab	m <sup>2</sup>	13.00		
3.1.36	8.1.2	REINFORCING				
3.1.36.1		Drill horizontal 150mm into existing tank walls and anchor (using anchoring adhesive) for Y12 dowel bars (priced below as part of reinforcing).	No.	200.00		
3.1.36.2	8.3.1	High tensile Reinforcing bars up to 32mm dia.	t	0.90		
3.1.36.3	8.3.2	Mesh ref 888	m <sup>2</sup>	27.00		
3.1.37	8.1.3	CONCRETE				
3.1.37.1	PSG 5.5.3.2	Concrete mix design	Sum	1.00		
3.1.37.2	8.4.3	25MPa/19mm concrete to bund floor & sump	m <sup>3</sup>	4.00		
3.1.37.3	8.5	Grind out 25mm wide by 20mm deep around perimeter joint, prime, and fill with Xypex concentrate or similar approved crystalline waterproofing grout mixture.	m	21.00		
3.1.38		UNFORMED SURFACE FINISHES				
3.1.38.1	8.4.4 (b)	Steel-floated finish to top of bund slab and sump.	m <sup>2</sup>	14.00		
3.1.39	PSG 5.5.8 PSG 8.4.7	CURING AND PROTECTION				
3.1.39.1		Bund slab and sump	m <sup>2</sup>	14.00		
3.1.40	SANS 1200HA	STRUCTURAL STEELWORK				
		Rates to include installation and corrosion protection as specified.				
Total Carried Forward						



**SCHEDULE 3 - HEAD OF WORKS**

## SECTION 3: HEAD OF WORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.1.40.1	8.3.3	Supply and install GMS ladders as detailed, complete with top extension hand grip as shown and cross bracing for hanging ladder.	No.	2.00		
3.1.40.2	8.3.3	Supply and install GMS ladders as detailed into bund sump.	No.	2.00		
3.1.40.3	8.3.4	Supply, fabricate, deliver and install 40x40 GMS grating (RS40 40x4.5). Grating segments to be banded.	m <sup>2</sup>	12.50		
3.1.40.4		Extra over above to form 700 (600 internal) opening for removable grating manhole.	No.	2.00		
3.1.40.5		700mm removable grating manhole fitted into GMS grating stated above.	No.	2.00		
3.1.40.6	8.3.2 (b)	Supply, fabricate, deliver and install coated GMS ball type handrailing to bund wall, to tie into existing. Height & style to match existing.	m	5.00		
3.1.40.7		Safety chain to 1t breaking load to the above hand railing	No.	2.00		
3.1.40.8	8.3.1	Galv. IPE200 S355 installed to grating support, fixed at ends.	m	10.00		
3.1.40.9	8.3.1	Galv. 100x100x8mm S355 angle section to walls for grating support, with galv. M12 chemical anchors (150mm deep) spaced at 300 centres,	m	10.00		
3.1.40.10		350mm DN50 HDPe pipe to sump drain, cored and cast into wall with Xypex concentrate mix (or similar approved) with ball valve.	No.	2.00		
Total Carried Forward To Summary						

**SCHEDULE 3 - HEAD OF WORKS**

## SUMMARY OF SECTIONS

SECTION	DESCRIPTION	AMOUNT (RAND)
3.1	SECTION 3: HEAD OF WORKS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
4.1		<b>SECTION 4: FLOCCULATION TANKS</b>				
4.1.1	SANS 1200C PSC	SITE CLEARANCE				
4.1.1.1	8.2.1	Clear and grub site	m <sup>2</sup>	300.00		
4.1.1.2	8.2.8	Demolition of existing inlet works to limit of demolition as shown, including removal from site to registered land fill. Demolition to only commence when new inlet works with temporary bypass line has been completed (including dosing and mechanicals etc. complete) and water redirected.	Sum	1.00		
4.1.2	SANS 1200 D PSD	EARTHWORKS				
4.1.2.1	8.3.1.2	Remove topsoil to a normal depth of 150mm stockpile & maintain in accordance with the environmental specifications.	m <sup>2</sup>	300.00		
4.1.3	8.3.3	RESTRICTED EXCAVATION				
4.1.3.1	8.3.3	Restricted excavation in all materials and use for embankment or backfill or dispose, as ordered (freehaul of 1.0km)	m <sup>3</sup>	600.00		
	8.3.3.2	Extra-over items 4.3.1 for in:				
4.1.3.2		2) Hard Rock excavation	m <sup>3</sup>	30.00		
4.1.4	8.3.4	IMPORTED MATERIAL				
4.1.4.1		a) One layer 150mm G5 from commercial source compacted to 93% mod Aashto under blinding.	m <sup>3</sup>	30.00		
4.1.5	8.3.6	OVERHAUL				
4.1.5.1		b) Long Overhaul (provisional) for material to spoil	m <sup>3</sup> .km	1,200.00		
4.1.6		FINISHING				
4.1.6.1	8.3.10	Top soiling 150mm thick from stock pile item above.	m <sup>2</sup>	140.00		
4.1.6.2	8.3.11	Grassing as specified in the environmental specifications.	m <sup>2</sup>	140.00		
4.1.7	SANS 1200F	PILING				
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.7.1	8.2.1	End-bearing auger/bore replacement type piling designed by specialist piling (550 kN max load, 150kN max. tension load) contractor including minimum 3 x Diameter rock socket, freehaul of 1.0km, reinforcing, concrete, etc. complete. The pile design should allow for 55kN horizontal load and top connection moment of 100kN.m. To be designed for severe exposure conditions and 50 year life span. To be submitted for approval.				
		Establishment on Site for Piling	Sum	1.00		
4.1.7.2	8.2.2	Move Equipment to and set up at each Pile Position	No.	18.00		
		Piling through material situated in the following successive depth ranges. Including auguring/boring through obstructions, temporary casings, reinforcing, concrete, stripping/cutting pile head, etc complete as deemed required.				
4.1.7.3		a) over 0m and up to 10m	m	180.00		
4.1.7.4		b) over 10m and up to 15m	m	27.00		
4.1.7.5		c) over 15m and up to 20m	m	5.00		
4.1.7.6		Low energy Frequency Response dynamic pile integrity testing on all piles by independent specialist consultant.	No.	18.00		
4.1.7.7		Installation of (complete), and Load testing of additional piles to destruction (Dynamic Load Test)	No.	2.00		
4.1.8	SANS 1200G PSG	CONCRETE (STRUCTURAL)				
		SUPPLEMENTARY PREAMBLES:				
		Cost of tests				
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		<p>The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SANS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the Engineer. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the Engineer. (Number of test to be included in accordance with SANS1200G)</p> <p>Formwork</p> <p>Descriptions of formwork shall be deemed to include use and waste only (except where described as "left in" or "permanent"), for fitting together in the required forms, wedging, plumbing and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re-use</p> <p>The vertical strutting shall be carried down to such construction as is sufficiently strong to afford the required support without damage and shall remain in position until the newly constructed work is able to support itself</p> <p>Formwork to soffits of solid slabs etc shall be deemed to be to slabs not exceeding 250mm thick unless otherwise described</p> <p>Formwork to soffits of slabs, beams, etc shall be deemed to be propped up exceeding 1,5m and not exceeding 3,5m high unless otherwise described</p> <p>Formwork to sides of bases, ground beams, etc will only be measured where it is prescribed by the engineer for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in "Earthworks"</p>				
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.9	8.1.1 PSG8.2.2	FORMWORK				
		Vertical formwork				
4.1.9.1		Screed/plaster vertical sides to pile caps (to serve as external pile cap permanent shutter.	m <sup>2</sup>	30.00		
4.1.9.2	8.2.1	Rough vertical to Sides of flocculation tank base	m <sup>2</sup>	16.00		
4.1.9.3	8.2.2	Smooth vertical to Flocculation tank	m <sup>2</sup>	280.00		
4.1.9.4	8.2.2	Smooth vertical to Inlet channel and chamber	m <sup>2</sup>	120.00		
4.1.9.5	8.2.2	Smooth vertical to baffle walls (rapid mix inlet channel)	m <sup>2</sup>	12.00		
4.1.9.6	8.2.2	Smooth vertical to Outlet channel	m <sup>2</sup>	32.00		
4.1.9.7	8.2.2	Smooth vertical (including curved) to connecting channel	m <sup>2</sup>	43.00		
4.1.9.8	8.2.2	Smooth vertical to stairs	m <sup>2</sup>	3.00		
4.1.9.9		Formwork for steps	No	12.00		
		Horizontal formwork				
4.1.9.10	8.2.2	Smooth horizontal to walkway slabs	m <sup>2</sup>	38.00		
		Narrow widths				
4.1.9.11	8.2.5	150mm Smooth horizontal narrow to walkway sides	m	53.00		
4.1.9.12	8.2.5	250mm Smooth horizontal narrow to underside of walls (inlet chamber, inlet channel, and central wall openings)	m	12.00		
4.1.9.13	8.2.5	250x250 vertical smooth column shutter to central wall column, flocculation tanks	m	2.00		
4.1.9.14	8.2.5	250mm smooth vertical narrow widths to wall openings (sides of weirs, outlets, and central wall bottom holes)	m	20.00		
		Box-outs / form voids				
4.1.9.15	8.2.6 (b)	Form voids in walkway slab for mixers, 300 dia.	No.	8.00		
4.1.9.16		50mm PVC pipes cast into baffle walls	No.	35.00		
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.9.17	8.2.6 (d)	Other than circular, up to and including 0.1m <sup>2</sup> up to 350 deep	No.	4.00		
4.1.9.18	8.2.6 (d)	Other than circular, up to and including 0.5m <sup>2</sup> up to 350 deep	No.	8.00		
4.1.9.19	8.2.6 (d)	Square up to and including 0,5m <sup>2</sup> up to 350 deep	No.	1.00		
4.1.9.20		Box-out special for temporary interconnecting of the outlet channel during operation of temporary bypass line, including coating of reinforcing as shown on the drawings.(60398/36)	No.	1.00		
4.1.9.21		Box-out special circular for temporary connection to the bypass line, including coating of reinforcing as shown on the drawings. (60398/36)	No.	1.00		
4.1.10	8.1.2 PSG 8.1.2	REINFORCING				
4.1.10.1	8.3.1	High tensile Reinforcing bars up to 32mm dia.	t	23.00		
4.1.10.2	8.3.2	Mesh ref 888	m <sup>2</sup>	45.00		
4.1.11	8.1.3	CONCRETE				
4.1.11.1	PSG 5.5.3.2	Concrete mix designs	Sum	1.00		
		Blinding in 15MPa/19mm				
4.1.11.2	8.4.2	50mm blinding below pile caps	m <sup>2</sup>	13.00		
4.1.11.3	8.4.2	50mm blinding under structure	m <sup>2</sup>	110.00		
4.1.11.4	8.4.2	50mm blinding under inlet/outlet channels/chambers	m <sup>2</sup>	50.00		
4.1.11.5	8.4.2	50mm blinding under connecting channel	m <sup>2</sup>	17.00		
	8.4.3	35MPa/19mm watertight concrete to:				
4.1.11.6	8.4.3	Pile Caps	m <sup>3</sup>	7.00		
4.1.11.7	8.4.3	350mm floor slab to pile caps	m <sup>3</sup>	40.00		
4.1.11.8	8.4.3	Flocculation tank walls	m <sup>3</sup>	40.00		
4.1.11.9	8.4.3	Walkway slabs	m <sup>3</sup>	9.00		
4.1.11.10	8.4.3	Inlet chamber and channel	m <sup>3</sup>	23.00		
4.1.11.11	8.4.3	Outlet channel	m <sup>3</sup>	7.00		
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.11.12	8.4.3	Connecting channel	m <sup>3</sup>	9.50		
		25MPa/19mm concrete to:				
4.1.11.13	8.4.3	Stairs	m <sup>3</sup>	1.50		
		15MPa/19mm concrete to:				
4.1.11.14	8.4.3	Thickenings to temporary bypass line pipe	m <sup>3</sup>	0.75		
		No-fines concrete:				
4.1.11.15	PSG 5.5.b11	No-fines concrete to toe of base slab as shown.	m <sup>3</sup>	5.00		
		Special concrete:				
		45MPa no/low shrink quick set repair concrete to fill in temporary bypass box-outs (placed and cured under shut-down conditions). Side walls to be primed with dry to wet concrete primer, and a central bead of sikaswell (or similar approved). (Ref drawing 60398/36)				
4.1.11.16		Outlet channel interconnection box-out.	Sum	1.00		
4.1.11.17		Circular box out for temporary connection to the bypass line	Sum	1.00		
4.1.11.18		Circular break-out in existing inlet channel for temporary connection to bypass line.	Sum	1.00		
	8.4.4 PSG 5.2.1	Unformed Surface Finish				
4.1.11.19	8.4.4 (a)	Wood floated finish to base toe	m <sup>2</sup>	22.00		
4.1.11.20	8.4.4 (b)	Steel-floated finish to flocculation tank floor	m <sup>2</sup>	80.00		
4.1.11.21	8.4.4 (b)	Steel-floated finish to walkway slab	m <sup>2</sup>	55.00		
4.1.11.22	8.4.4 (b)	Steel-floated finish to top of walls (excluding sloped)	m <sup>2</sup>	17.00		
4.1.11.23	8.4.4 (b)	Steel-floated finish to inlet channel and chamber slab (excluding sloped)	m <sup>2</sup>	17.00		
4.1.11.24	8.4.4 (b)	Steel-floated finish to outlet channel slab	m <sup>2</sup>	12.00		
Total Carried Forward						



**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.11.25	8.4.4 (b)	Steel-floated finish, sloped, to rapid mixing channel floor	m <sup>2</sup>	10.00		
4.1.11.26	8.4.4 (b)	Steel-floated finish, sloped, to rapid mixing channel walls	m <sup>2</sup>	4.00		
4.1.11.27	8.4.4 (b)	Steel-floated finish to connecting channel floor	m <sup>2</sup>	13.00		
4.1.11.28	8.4.4 (b)	Steel-floated finish to top of connecting channel walls	m <sup>2</sup>	5.00		
4.1.12	PSG 5.5.8 PSG 8.4.7	CURING AND PROTECTION				
4.1.12.1		Flocculation Tank base	m <sup>2</sup>	16.00		
4.1.12.2		Flocculation Tank walls	m <sup>2</sup>	280.00		
4.1.12.3		Inlet channel and chamber walls	m <sup>2</sup>	120.00		
4.1.12.4		Baffle walls	m <sup>2</sup>	12.00		
4.1.12.5		Outlet channel	m <sup>2</sup>	32.00		
4.1.12.6		Connecting channel	m <sup>2</sup>	43.00		
4.1.12.7		Stairs	m <sup>2</sup>	5.00		
4.1.12.8		Walkway edges	m <sup>2</sup>	9.00		
4.1.12.9		Flocculation Tank base toe top	m <sup>2</sup>	22.00		
4.1.12.10		Flocculation tank floor top	m <sup>2</sup>	80.00		
4.1.12.11		Walkway slab top	m <sup>2</sup>	55.00		
4.1.12.12		Top of walls	m <sup>2</sup>	30.00		
4.1.12.13		Chamber slab	m <sup>2</sup>	12.00		
4.1.12.14		Mixing channel floor	m <sup>2</sup>	10.00		
4.1.12.15		Connecting channel floor	m <sup>2</sup>	13.00		
4.1.13		JOINTS				
4.1.13.1	8.5	200 x 2mm thick sikadur combiflex system or similar approved	m	350.00		
4.1.13.2	8.5	250 x 3mm thick plasticized PVC type control waterbar with clips to reinforcing	m	260.00		
4.1.13.3	8.5	"Sikaswell P" Extrudable Water swelling Profile joint sealing waterstop (Provisional)	m	5.00		
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.14	SANS 1200HA PSHA	STRUCTURAL STEELWORK				
4.1.14.1	8.3.2	Supply, fabricate, deliver and install coated GMS ball type handrailing, Height & style to match existing. (including sloped as shown), complete.	m	160.00		
4.1.14.2	8.3.2	Supply, fabricate, deliver and install coated GMS ball type handrailing to existing clarifier wall. Height & style to match existing.	m	20.00		
4.1.14.3		Swing gate to ball type handrailing as detailed	No.	2.00		
4.1.14.4		Stainless steel ladder to flocculation tank walls to 2,5m high with extended lugs for handgrip	No.	2.00		
4.1.14.5		Supply, fabricate, deliver and install 40x40 GMS grating (40x3 bearer bar). Grating segments to be banded. Holes to manufactured for items such as hand railing stanchions, hand stop slits, and jib crane support.	m <sup>2</sup>	28.00		
4.1.14.6		Supply, fabricate, deliver and install 50x50(x5mm) GMS support beam for grating, fixed to wall with galv. M12 chemical anchors at 300mm spacing	m	10.00		
4.1.14.7		Supply, fabricate, deliver and cast in 40x40(x3mm) GMS support bracket for grating, cast in with fishtails at 300mm centres.	m	45.00		
4.1.15		MISCELLANEOUS WORK				
		DRAINAGE				
4.1.15.1		110mm PVC Drain pipe under gully drain, laid to minimum 2% fall to daylight.	m	40.00		
		DUCTS				
4.1.15.2		DN50 PN12 HDPE sleeves with SS draw wire	m	50.00		
		FIRE SAFETY				
4.1.15.3		Supply and install 9kg DCP fire extinguisher to wall, complete with weather cabinet and signage.	No.	1.00		
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.15.4	PSG 7.3.9	Supply and install 5kg CO2 fire extinguisher to wall, complete with weather cabinet and signage.	No.	2.00		
4.1.16		TESTING AND COMMISSIONING				
4.1.16.1		Testing of flocculation tank for water tightness in accordance with the specifications.	Sum	1.00		
4.1.16.2	SANS 1200ME, MJ, MK, MF	Temporary blocking off the inlet chamber and testing for water tightness in accordance with the specifications	Sum	1.00		
4.1.17		SEGMENTED PAVED WALKWAY				
4.1.17.1		Compaction to 95% Mod AASHTO of 150mm thick insitu layer under C4 (priced below)	m²	45.00		
4.1.17.2	MF8.3.3-8	Supply from commercial sources, construct, stabilise with 4% cement 125mm thick gravel sub-base C4 layer compacted to 97% mod AASHTO	m²	45.00		
4.1.17.3	MK8.2.2	Supply, lay to levels and bed precast concrete half-round drain 330mm wide	m	15.00		
4.1.17.4	MK8.2.2	Cast in situ segments with gully grid, complete with SS gully grid and sweep tee connection to drain pipe, in 20MPa/19mm concrete.	No.	4.00		
4.1.17.5	MK8.2.2	Cast in situ 200x200 concrete edge beam in 20MPa/19mm concrete	m	20.00		
4.1.17.6	MK8.2.2	Supply, lay and bed including 20mm sand bedding, jointing sand, and edge trimming as required, 60mm type S-A paving in herringbone.	m²	65.00		
4.1.18	SANS 1200L PSL	PIPEWORK				
		Rates to include necessary couplings, sockets, flange jointing material, cutting, welding, joining, lining, coating, and coating repair on site as necessary.				
4.1.18.1		DN500 PN10 epoxy coated and lined flanged / bell ended (DN700) bend special to bypass line, with puddle.	No.	1.00		
Total Carried Forward						

**SCHEDULE 4 - FLOCCULATION TANKS****SECTION 4: FLOCCULATION TANKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.1.18.2		DN500 PN10 epoxy coated and lined flanged / bell ended (DN700) pipe 3400 long to bypass line, with puddle.	No.	1.00		
4.1.19	SANS 1200A	PROVISIONAL SUMS				
4.1.19.1	8.5 (a)	Provide the Provisional Sum of R25000 for signage and painting as instructed by the Engineer	Prov Sum	1.00		
4.1.19.2		Contractors markup on above	%	25,000.00		
Total Carried Forward To Summary						

**SCHEDULE 4 - FLOCCULATION TANKS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
4.1	SECTION 4: FLOCCULATION TANKS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
5.1		<b>SECTION 5: WATERWORKS EQUIPMENT</b>				
5.1.1	PWW	WATERWORKS EQUIPMENT: PWW				
		HEAD OF WORKS EQUIPMENT (Ref Drawing 60398/35-60398/39)				
5.1.1.1	PWW 8.1	Supply and install DN500 PN10 clockwise closing wedge gate valve with rising spindle (AIWC)	No.	1.00		
5.1.1.2	PWW 8.2	Supply and install DN400 PN10 electromagnetic flowmeter (AIWC)	No.	1.00		
5.1.1.3	PWW8.3,8.4	Supply and install DN500 PN10 knife gate valve complete with electric actuator suitable for flow modulation	No.	1.00		
5.1.1.4	PWW 9.1	Supply and install automated inclined stainless steel racked screen with bottom turnabout (Huber RakeMax or similar approved) complete with shaftless screw conveyor	No.	1.00		
5.1.1.5	PWW 9.2	Supply and Install manually racked standby stainless steel screen	No.	1.00		
5.1.1.6	PWW 9.3	Supply and install 500X500mm stainless steel penstock and frame (Penstock to be lockable in position)	No.	1.00		
5.1.1.7	PWW 9.3	Supply and install 1.32x1.2m stainless steel penstock and frame	No.	1.00		
5.1.1.8	PWW 9.3	Supply and install 1.12x0.7m stainless steel penstock and frame	No.	2.00		
5.1.1.9	PWW 9.3	Supply and install 1.12x0.97m stainless steel penstock and frame	No.	1.00		
5.1.1.10	PWW9.5	Supply and install ultrasonic depth indicator complete with DN300 PVC stilling well	No.	1.00		
5.1.1.11	PWW 9.6	Supply, deliver and install inlet chamber weir plate (SS304L) for inlet level control and flow measurement, as detailed on the drawings.	No.	1.00		
5.1.1.12	PWW 9.6	Supply, deliver and install 1200x200x2mm thick (SS304L) inlet weir plates to +/- 2mm level accuracy.	No.	4.00		
5.1.1.13	PWW13.2	Supply and install streaming current detector in IP67 wall mounted enclosure complete with sample pump and pipework	No.	1.00		
Total Carried Forward						

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
5.1.1.14	PWW 9.4	1,04x0.26m aluminium hand stop complete with frame and lifting hook as detailed.	No.	4.00		
5.1.1.15	PWW 9.6	Extra over item above for bracket(by contractor) for storage of handstops when not in use	No.	4.00		
5.1.1.16	PWW 9.3	Supply and install 1.0x0.7m stainless steel penstock and frame	No.	2.00		
5.1.1.17	PWW 10.1	Supply, deliver and install vertical mechanical mixers with VSDs in flocculation tank, in accordance with specification.	No.	8.00		
5.1.1.18	SANS 1200HA PSHA	Design, supply, and install complete (SS316) swing jib crane to 200kg rated load, maximum x/500 deflection, complete with load test and certificate. (See drawings 60398/35 and 60398/36 for concept).	No.	4.00		
5.1.1.19		Supply removable / easy assembly hoist chain trolley (stainless steel) to the above jib crane, min. 200kg rated capacity	No.	1.00		
5.1.1.20		Supply chain block to min. 5m lifting height, rated to min. 200kg capacity.	No.	1.00		
5.1.1.21		Provisional sum for the provision of additional safety equipment and signage as directed by the Engineer.	Prov Sum	1.00		
5.1.1.22		Contractor's mark-up for overheads and profit on item above	%	75,000.00		
5.1.1.23		Supply heavy duty platform trolley to minimum 200kg load capacity with minimum 350mm dia. Wheels (Min. 1.0mx0.6m platform size)	Sum	1.00		
5.1.2		TEMPORARY BYPASS WORKS  (Ref Drawing 60398/36)				
Total Carried Forward						

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
5.1.2.1		Design, supply, and install (under shutdown conditions) complete temporary channel isolation plug (epoxy coated MS) to block backflow into existing inlet channel during operation of temporary bypass line from new flocculation tanks, as shown in concept on the drawings, complete with all materials as required (sealants, epoxy bolts assemblies, etc).	No.	1.00		
5.1.2.2		Design, supply, and install complete temporary flocculation tank outlet plates (primary leak protection) to prevent water passing through to final flow path during operation of temporary bypass line, as shown in concept on the drawings, complete with all materials as required (sealants, epoxy bolts assemblies, etc).	No.	2.00		
5.1.3		CLARIFIER COMPLEX (Ref Drawing 60398/40)				
5.1.3.1	PWW 11.1	Drain and clean Dortmund clarifiers	No.	6.00		
5.1.3.2	PWW11.2	Removal of redundant clarifier equipment, including asbestos cement launder pipes, sludge hoppers, steel support structures etc to EWS stores or Municipal waste site as instructed, in accordance with applicable Health and Safety and Environmental legislation	Sum	1.00		
5.1.3.3		Manufacture, supply, and install new sludge hopper/concentrator cone and launder support structure (Epoxy coated heavy duty galvanised structural steel grade S355) as shown on the drawings. The rate shall cover the cost of preparing shop drawings, supply of all materials, fabrication, loading, transporting to site, off loading, erection, anchoring (chemical anchors) and supports, all fasteners, washers, isolation/bearing strips and bolt assemblies, temporary bracing as necessary, etc. complete.	No.	6.00		
Total Carried Forward						



**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
5.1.3.4	PWW11.4	Extra over above for additional on-site Epoxy coating complete launder support assembly once installed, including prepping and coating galv. Bolts, touch ups, etc. Measured per clarifier. To be levelled to +/-2mm across all launders and including across all clarifiers.	No.	6.00		
5.1.3.5		Prepare shop drawings for approval, manufacture, supply, deliver, and install new launders (SS316) as detailed (each launder length to be seamless), to support structure and to walls as shown. No Ferro-magnetic metal to non Ferro-magnetic metal contact shall rely on insulation through coating only, and shall instead have proper isolating bearing/pad/etc.	m	440.00		
5.1.3.6		Design, submit for approval, manufacture, and installation of Non-ferro-magnetic (300 range) Stainless Steel pulley system as detailed on the drawings, including ss wire-rope, ss pulley blocks, ss wire-rope winch, and winch support. No Ferro-magnetic metal to non-ferro-magnetic metal contact shall rely on insulation through coating only, and shall instead have proper isolating bearing/pad/etc. design. To suit up to 8m lifting range.	No.	6.00		
5.1.3.7		Deliver, supply and install new 2.5m diameter sludge hopper/concentrator complete as per specification including flexible pipe with couplings etc. complete.	No.	6.00		
5.1.3.8		Squaring off of Launder outlet holes, including breaking back concrete and trowel applied repair grout to suit new launder profile.	No.	48.00		
5.1.4		<b>FILTER COMPLEX</b>				
5.1.4.1	PWW 12.1	Supply, deliver and install new removable clear FRP/Perspex covers to clearwells.	No	6.00		
5.1.4.2	PWW12.2	Supply and install filter media depth indicator plates	No.	6.00		
5.1.4.3	PWW12.3	Provide the Provisional sum of R200 000 for top-up of filter media	Prov Sum	1.00		
Total Carried Forward						

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)	
Brought Forward							
5.1.4.4	PWW	Contractor's mark-up for overheads and profit on item above	%	200,000.00			
5.1.4.5		Provide the Provisional Sum of R120 000 for the rehabilitation of inlet clack valves	Prov Sum	1.00			
5.1.4.6		Contractors mark-up for overheads and profits on item above	%	120,000.00			
5.1.5	PWW13.1	POLYMER SYSTEM - FILLING, STORAGE, DOSING, MONITORING AND CONTROL  (Ref Drawing 60398/41)					
5.1.5.1		Design, supply and install polymer storage and dosing facility complete as specified. The rate to also include for coring of concrete walls to accommodate pipework as per the Contractor's design and excavation and bedding for buried pipe between the dosing pumps and sparge pipe at the new inlet.	Sum	1.00			
5.1.5.2		Provide the Provisional sum of R35 000 for an allowance for refurbishment and or replacement of existing polymer dosing equipment and pipework's.	Prov Sum	1.00			
5.1.5.3		Contractor's mark-up for overheads and profit on item above	%	35,000.00			
5.1.5.4		PWW 13.2	Refurbish and deliver to stores existing Streaming Current Detector (SCD) complete	No	1.00		
5.1.5.5		PWW13.2	Supply and deliver to EWS stores new SCD sample pump as per that specified in PWW 13.2.	No	1.00		
5.1.5.6			Provide the Provisional sum of R15 000 for the supply and deliver safety signage	Prov Sum	1.00		
5.1.5.7			Contractor's mark-up for overheads and profit on item above	%	15,000.00		
5.1.5.8		PWW13.1	Testing and commissioning of the existing and new polymer dosing system.	Sum	1.00		
5.1.5.9			Supply and install backflow prevention valve on the polymer dosing motive water supply line.	No	1.00		
Total Carried Forward							

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
5.1.6		DISINFECTION - CHLORINE SYSTEM				
5.1.6.1	PWW 13.3a	Supply, deliver and install new standby chlorinator and associated works complete as specified to the "Vacuum Room".	Sum	1.00		
5.1.6.2	PWW 13.3b	Supply, deliver and install new DN50 Class 12 chlorine dosing pipework from the existing chlorine room to the new head of works, including all excavation, bedding, backfill, pipework, bends, valves, couplings, connections, pipe supports and DN50 Class 12 PVC perforated sparge pipe and tie into motive water system complete as specified.	Sum	1.00		
5.1.6.3		Provision sum for the provision of additional safety equipment and signage to improve the safety of the installation as directed by the Engineer.	Prov Sum	1.00		
5.1.6.4		Contractor's mark-up for overheads and profit on item above	%	75,000.00		
5.1.6.5	PWW 13.3	Allowance for the assessment, testing, report, recommendation, rehabilitation/servicing of the existing chlorine dosing system. Including for the testing, servicing, and calibration of the existing load cells for the 1t chlorine tanks.	Prov Sum	1.00		
5.1.6.6		Contractor's mark-up for overheads and profit on item above	%	300,000.00		
5.1.6.7		Facilitation of HAZOP study and preparation of report as specified.	Sum	1.00		
5.1.6.8		Facilitation of MHI study and preparation of report as specified.	Sum	1.00		
5.1.6.9		Civil works for bollard protection and chain at chlorine house to protect from skip loading/unloading etc.	Prov Sum	1.00		
5.1.6.10		Supply and install backflow prevention valve on the chlorine dosing motive water supply line.	No	1.00		
5.1.7		MEASUREMENT OF KEY DETERMINANDS				
Total Carried Forward						

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SECTION 5: WATERWORKS EQUIPMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		Supply and install online analysers complete with sample pump, sample pipework, rotameter etc. complete as specified to:				
5.1.7.1	PWW14.1	Turbidity: Raw Water	No	1.00		
5.1.7.2	PWW14.2	pH: Raw Water	No	1.00		
5.1.7.3	PWW14.3	Conductivity: Raw Water	No	1.00		
5.1.7.4	PWW14.4	Free Chlorine: Clarified Water	No	1.00		
5.1.7.5	PWW14.5	Turbidity: Clarified Water	No	1.00		
5.1.7.6	PWW14.6	Turbidity: Filtered Water	No	6.00		
5.1.7.7	PWW14.7	Turbidity: Potable Water	No	1.00		
5.1.7.8	PWW14.8	pH: Potable Water	No	1.00		
5.1.7.9	PWW14.10	Free Chlorine: Potable Water	No	1.00		
5.1.8		REVIEW FOR COMPLIANCE				
5.1.8.1		Preparation of shop drawings and "goodness of fit" of mechanical pipework and fittings	Sum	1.00		
5.1.8.2		Provision of laboratory equipment	Prov Sum	1.00		
5.1.8.3		Contractor's mark-up for overheads and profit on item above	%	200,000.00		
5.1.9		ASSET MANAGEMENT AND PROVISION OF LIST OF SPARES				
5.1.9.1		Provision for critical spares	Prov Sum	1.00		
5.1.9.2		Contractor's mark-up for overheads and profit on item above	%	1,000,000.00		
5.1.9.3		Provision for the supply and delivery of chemicals required for the dosing systems at the water treatment works for continuous operation over the 6 months trial period.	Prov Sum	1.00		
5.1.9.4		Contractor's mark-up for overheads and profit on item above	%	1,000,000.00		
Total Carried Forward To Summary						

**SCHEDULE 5 - WATERWORKS EQUIPMENT****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
5.1	SECTION 5: WATERWORKS EQUIPMENT	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.1		<p><b>ALTERATIONS</b></p> <p><b>NOTES:</b></p> <p>Items described as to be re-used or to be handed over to the Client are to be carefully dismantled where necessary and stacked on site where directed, and the Contractor will be responsible for their removal and storage until required, and shall make good all items missing, damaged or broken at his own expense. All works references Dwgs 60398/11</p> <p>Alterations to the fabric of existing structures will be executed in stages concurrently with the construction of the new work to ensure that the waterproofing integrity of the structures is maintained.</p> <p>Unless otherwise described, no materials from the alterations shall be re-used in any new work without the written approval of the client, with the exception of facing bricks required in filling to openings, etc., which may be re-used if free of cracks and chips and properly cleaned of all mortar</p> <p>The Contractor is to take all dimensions affecting the existing buildings on the site as he will be solely responsible for all new work being to the correct sizes. The Engineer's Representative is to be notified immediately of any discrepancies between the drawings and the existing work and all work affected by these discrepancies is to be suspended until such time as the Engineer's Representative shall authorise its continuance</p> <p>Prices are to include for carting away from site all materials not specifically mentioned as being stored on site for re-use or handed over to the client and all rubbish, debris, etc., arising from the alterations, etc., and for making good all work damaged or disturbed to the approval of the client</p>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.1.1		<b>Tenderers are to include in pricing for the statutory requirements with regard to the demolition and disposal of asbestos cement material arising from the works</b>				
		<b>GENERAL</b>				
6.1.1.1		Allow for protecting all existing work liable to suffer damage (i.e. walls, finishes, floors, windows, etc.) from damage during the building operations, alterations, etc., and make good all work damaged with new material to match existing to the approval of the client	Sum	1.0		
6.1.1.2		Dust screens of minimum height 3000mm (equal height throughout), between concrete floor and ceiling, roof slab, or floor slab above, of suitable timber framing with 375 micron polyethylene sheeting fixed on one side, including corners, ends, and any other intermediate posts and bracing as may be required for support, stability, etc	m	10.0		
6.1.2		<b>REMOVAL OF EXISTING WORK</b>				
		Breaking down and removing brickwork etc				
6.1.2.1		Single skin wall	m <sup>2</sup>	15.0		
		Taking out and removing doors, windows, etc., from brickwork to remain (building up or altering opening elsewhere measured)				
6.1.2.2		Hardwood single door and frame not exceeding 2,5m <sup>2</sup>	No.	6.0		
6.1.2.3		Glazed steel window not exceeding 2,5m <sup>2</sup>	No.	6.0		
		Taking out doors, windows, etc including thresholds, sills, etc from brickwork to be demolished and stored for reuse as directed by the Engineer.				
6.1.2.4		Soap dispenser from brick walls	No.	2.0		
6.1.2.5		Taking out and removing sundry joinery work, fittings, etc.	No.	10.0		
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.1.2.6		Change room bench from wall	No.	2.0		
6.1.2.7		Existing lab chipboard cupboards and doors	m	6.0		
		Hacking up/off and removing ceramic tile floor finishes including removing mortar bed or backing and preparing concrete or brick surfaces for new screed, plaster or tile finishes (elsewhere measured)				
6.1.2.8		Ceramic tiles on floors	m <sup>2</sup>	50.0		
		Hacking up/off and removing white glazed tile wall finishes including removing mortar bed or backing and preparing concrete or brick surfaces for new screed, plaster or tile finishes (elsewhere measured)				
6.1.2.9		White glazed ceramic tiles to walls	m <sup>2</sup>	20.0		
		Taking out and removing piping, sanitary fittings, etc. including disconnecting piping and stopping off fittings and making good floor and wall finishes (new tiling and paintwork elsewhere measured)				
6.1.2.10		Water supply pipework including fittings not exceeding 75mm diameter, inclusive of ancillary works	m	75.0		
6.1.2.11		Stainless steel double bowl sink and drainer including fittings, etc, inclusive of ancillary works	No.	1.0		
6.1.2.12		Ceramic wash hand basin, including short lengths of piping, fittings, etc, inclusive of ancillary works	No.	2.0		
6.1.2.13		Urinal, inclusive of ancillary works	No.	2.0		
6.1.2.14		Shower, inclusive of ancillary works	No.	1.0		
		Taking out and removing glass and mirrors				
6.1.2.15		Mirror 1300 x 1500mm high from wall	No.	1.0		
		<u>Breaking down, cutting, and removal of brickwork</u>				
6.1.2.16		Windows & Doors	m <sup>2</sup>	10.00		
6.1.3	<b>PABR</b>	<b>BUILDING UP OPENINGS</b>				
Total Carried Forward						



**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
	PABR	<b>External facebrick in Roan Satin FBX and internal common brick NFP for plaster and paint finish, brickwork in class II mortar in building up openings, including bonding new to existing and making good cement plaster (making good paintwork elsewhere)</b>				
6.1.3.1		External facebrick	m²	20.0		
6.1.3.2		Internal common brick	m²	20.0		
		<b>Internal common brick NFP in class II mortar in building up openings, including bonding new to existing and making good cement plaster on both sides (making good paintwork elsewhere)</b>				
6.1.3.3		Single skin walls	m²	10.0		
6.1.3.4		Double skin walls	m²	10.0		
		<b>Sundries</b>				
6.1.3.5		Cutting, toothing and bonding new brick walls to existing brick walls	m²	40.0		
6.1.4		<b>PREPARATORY WORK TO EXISTING SURFACES</b>				
		<b>Preparatory work to existing surfaces</b>				
6.1.4.1		Making good to walls where white glazed tiles removed to receive new finish (Elsewhere measured)	m²	20.0		
6.1.4.2		Making good to floors where ceramic tiles removed to receive new floor finish (Elsewhere measured)	m²	50.0		
6.1.4.3		Remove paint and plaster surface from existing walls	m²	120.0		
6.1.5		<b>OPENINGS THROUGH EXISTING WALLS ETC</b>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.1.5.1	PABR	<b>Breaking out for and forming openings through brick walls for new doors and frames, including pre-stressed concrete lintels, making good cement plaster on both sides and into reveals and with 20 MPa concrete thresholds with steel trowelled finish (new doors and frames and making good paintwork elsewhere)</b>  Opening for door with timber frame 915 x 2134mm high overall through half brick wall	No.	1.0		
6.1.6		<b>BRICKWORK SUNDRIES</b>  <u>Brick on edge lintels (into existing structure)</u>				
6.1.6.1		110 x 150mm lintels in lengths not exceeding 3m  <u>Brick on edge sills (into existing structure)</u>	m	12.00		
6.1.6.2		110 x 150mm sills in lengths not exceeding 3m	m	10.00		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.2: CONCRETE, FORMWORK AND REINFORCING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.2	SANS 1200 G, PSG	<p><b>CONCRETE, FORMWORK, AND REINFORCING</b></p> <p><b>SUPPLEMENTARY PREAMBLES:</b></p> <p><b>Cost of tests</b></p> <p>The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SANS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the Engineer. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the Engineer. (Test cubes are measured separately)</p> <p><b>Formwork</b></p> <p>Descriptions of formwork shall be deemed to include use and waste only (except where described as "left in" or "permanent"), for fitting together in the required forms, wedging, plumbing and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re-use</p> <p>The vertical strutting shall be carried down to such construction as is sufficiently strong to afford the required support without damage and shall remain in position until the newly constructed work is able to support itself</p> <p>Formwork to soffits of solid slabs etc shall be deemed to be to slabs not exceeding 250mm thick unless otherwise described</p> <p>Formwork to soffits of slabs, beams, etc shall be deemed to be propped up exceeding 1,5m and not exceeding 3,5m high unless otherwise described</p>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.2: CONCRETE, FORMWORK AND REINFORCING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.2.1	8.4.3	<b>Formwork to sides of bases, ground beams, etc will only be measured where it is prescribed by the engineer for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in "Earthworks"</b>				
6.2.1.1	PSG 5.5.3.2	<b>REINFORCED CONCRETE</b> Concrete mix design	Sum	1.0		
6.2.1.2	8.4.3 PSG5.5	<b>Slabs in 25MPa/19mm stone</b> 200mm thick roof slab	m <sup>3</sup>	34.0		
6.2.1.3		260mm thick floor slab	m <sup>3</sup>	29.0		
6.2.1.4		200mm thick new walkway	m <sup>3</sup>	10.0		
6.2.1.5		600mm thick wall beam	m <sup>3</sup>	4.0		
6.2.1.6		400mm thick floor beam	m <sup>3</sup>	5.0		
6.2.1.7		Columns	m <sup>3</sup>	2.00		
6.2.2	8.2, PSG 8.2.2	<b>SMOOTH FORMWORK</b> <b>Smooth finishes from formwork on:</b>				
6.2.2.1	8.2.2, PSG 8.2.2	<b>Vertical plane to:</b> Roof beam, external (long side)	m <sup>2</sup>	21.0		
6.2.2.2		Roof beam, internal (long side)	m <sup>2</sup>	21.0		
6.2.2.3		Roof beam, external (short side)	m <sup>2</sup>	9.0		
6.2.2.4		Roof beams, internal (short side)	m <sup>2</sup>	8.0		
6.2.2.5		400mm, beam (external)	m <sup>2</sup>	17.0		
6.2.2.6		400mm, beam (internal)	m <sup>2</sup>	16.0		
6.2.2.7		Columns (290mm x 290mm x 1000mm)	No.	12.0		
	8.2.2, PSG 8.2.2	<b>Horizontal plane to</b>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.2: CONCRETE, FORMWORK AND REINFORCING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.2.2.8	<b>8.2.5</b>	Roof slab soffit	m <sup>2</sup>	166.0		
6.2.2.9		Floor slab soffit	m <sup>2</sup>	114.0		
6.2.2.10		New walkway	m <sup>2</sup>	50.0		
		<b>Narrow widths up to 300mm for smooth finish from formwork on</b>				
		<b>Vertical plane to</b>				
6.2.2.11		Up to 200mm for concrete roof slab (including drip mould)	m	59.0		
6.2.2.12		Up to 260mm for floor slab	m	59.0		
6.2.2.13		Up to 200mm for walkway	m	59.0		
6.2.2.14		Up to 100mm step up in floor slab	m	49.00		
		<b>Horizontal plane to</b>				
6.2.2.15		290mm wide, beam	m	45.0		
6.2.3	<b>8.4.4 PSG 5.2.1</b>	<b>UNFORMED SURFACE FINISHES</b>				
	<b>8.4.4 b)</b>	<b>Steel-float finish to slabs</b>				
6.2.3.1		Roof slab	m <sup>2</sup>	166.0		
6.2.3.2		Walkway slab	m <sup>2</sup>	48.0		
6.2.3.3		Floor slab	m <sup>2</sup>	114.0		
6.2.4	<b>8.5, 5.5.7, PSG 5.5.7</b>	<b>JOINTS</b>				
6.2.4.1		Expansion joints with 10mm polystyrene between concrete roof slab and brick wall surfaces	m	100.0		
6.2.4.2		Expansion joints with 10mm polystyrene between concrete floor slab and concrete walkway slab	m	50.0		
6.2.4.3		Expansion joints with 10mm polystyrene between existing concrete roof slab and proposed concrete roof slab	m	12.0		
6.2.5	<b>8.3, PSG 8.1.2</b>	<b>REINFORCEMENT</b>				
	<b>8.3.1</b>	<b>Mild steel reinforcement to structural concrete work</b>				
6.2.5.1		Various diameter bars	t	1.1		
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.2: CONCRETE, FORMWORK AND REINFORCING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.2.5.2	<b>8.3.1</b>	<b>High tensile steel reinforcement to structural concrete work</b>				
		Various diameter bars	t	11.4		
	<b>8.3.2</b>	<b>High tensile welded mesh reinforcement</b>				
6.2.5.3		Mesh Ref 500	m <sup>2</sup>	50.0		
6.2.5.4		Mesh Ref 395	m <sup>2</sup>	50.0		
6.2.6	<b>PSG 5.5.8, PSG 8.4.7</b>	<b>CURING AND PROTECTION</b>				
6.2.6.1		Floor slabs	m <sup>2</sup>	114.0		
6.2.6.2		Wall Beams	m <sup>2</sup>	11.0		
6.2.6.3		Roof slab	m <sup>2</sup>	166.0		
6.2.6.4		New Walkway	m <sup>2</sup>	48.0		
6.2.6.5		Floor Beam	m <sup>2</sup>	17.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.3: MASONRY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.3		<b>MASONRY</b>  <b>SUPPLEMENTARY PREAMBLES:</b>  <b>Sizes in descriptions</b>  Where sizes in descriptions are given in brick units, 'one brick' shall represent the length and 'half brick' the width of a brick.  <b>Hollow walls, etc</b>  Descriptions of hollow walls shall be deemed to include leaving every fifth perpend of the bottom course of the external skin open as a weep hole.  Walls in two skins described as 'bagged and sealed' shall be deemed to include having the outer face of the inner skin bagged with 1:6 cement and sand mixture  <b>Face bricks</b>  Bricks shall be ordered timeously to obtain uniformity in size and colour  <b>Pointing</b>  Descriptions of recessed pointing to fair face brickwork and face brickwork shall be deemed to include square recessed, hollow recessed, weathered pointing, etc.				
6.3.1	PABR	<b>BRICKWORK IN SUPERSTRUCTURE</b>  In mortar class according to PABR 2.6:  <b>Existing Building</b>  New internal walls in common NFP brick to be plastered and painted (measured elsewhere)				
6.3.1.1		Single skin wall  <b>Proposed Administration Building</b>	m <sup>2</sup>	15.0		
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.3: MASONRY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
	PABR	<b>New external one brick walls in Roan Satin FBX facebrick skin externally with common NFP brick skin internally to be plastered and painted (measured elsewhere)</b>				
6.3.1.2		External facebrick skin	m²	128.0		
6.3.1.3		Internal common brick skin	m²	128.0		
		<b>New internal walls in common NFP brickwork to be plastered and painted (measured elsewhere)</b>				
6.3.1.4		Single skin wall	m²	50.0		
6.3.1.5		Double skin wall	m²	30.0		
6.3.2		<b>BRICKWORK SUNDRIES</b>				
		<b>Brick on edge lintels</b>				
6.3.2.1		110 x 150mm lintels in lengths not exceeding 3m	m	20.0		
	<b>Brick on edge sills</b>					
6.3.2.2	110 x 150mm sills in lengths not exceeding 3m	m	26.0			
Total Carried Forward To Summary						



**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.4: WATERPROOFING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.4		<b>WATERPROOFING</b>  <b>SUPPLEMENTARY PREAMBLES:</b>  <b>Waterproofing</b>  Waterproofing of roofs, etc shall be laid under a ten year guarantee. Waterproofing to roofs shall be laid to even falls to outlets etc with necessary ridges, hips and valleys. Descriptions of sheet or membrane waterproofing shall be deemed to include additional labour to turn-ups and turn-downs				
6.4.1		<b>DAMP PROOFING OF ROOF</b>  One layer of Derbigum SP (Special Polyester) waterproof sheeting sealed				
6.4.1.1		Top of Concrete Roof  One primer coat and one slurry coat Cemflex or similar approved coating, including water and portland cement for mix	m <sup>2</sup>	166.0		
6.4.1.2		In shower walls and floors	m <sup>2</sup>	80.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.5: METALWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.5	SANS 1200 H, PSHA, PACP	<b>METALWORK</b>				
6.5.1		<b>SUPPLEMENTARY PREAMBLES</b>  <p>The following to be finished with 25 microns powder coated, manufactured and installed in accordance with good building practice and in terms of the latest code of practice with revisions as recommended by SANS and AAAMSA</p> <p>Items shall be manufactured by an approved specialist who shall provide a sample upon request, for the Engineers approval</p> <p>Tenderers are advised to refer to the Architect's window and door schedules attached to these Bills of Quantities for details on drawing 030</p> <p>Tenderers are to note that should there be any doubt or obscurity as to the meaning and intent of any descriptions, the Contractor must have the same rectified and allow for same accordingly in his tender. The Contractor is to include in his rates for all that he considers necessary for the proper construction of the windows and doors. No claims whatsoever will be afterwards admitted due to the Contractor having failed to comply with these conditions</p> <p>Rates shall include for the following:</p> <p>1. All opening and fixed lights, coupling mullions and transoms, support steelwork, fittings, ironmongery, etc., as required and specified.</p> <p>2. Complete glazing as described, with and including matching aluminium glazing beads and gaskets and glazed in accordance with the manufacturer's written instructions</p>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.5: METALWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.5.2		<b>3. Building in and fixing into preformed openings. Window opening sizes to be verified on site before windows can be manufactured</b>  <b>4. Suitably protecting all exposed aluminium and glass surfaces with an approved protection tape and plastic sheeting. Such protection is to be removed at completion of the contract and the exposed surfaces cleaned down and left perfect. Under no circumstances will any damage whatsoever to the finished product be acceptable</b>  <b>5. Silicone pointing with a silicone sealant recommended by AAAMSA on all door / window and structure junctions</b>  <b>NATURAL ANODISED ALUMINIUM WINDOWS, DOORS, ETC.</b>  <b>Note: Tenderers are to refer to the Architects door schedules when pricing the items hereunder</b>  <b>Hardwood Meranti door frames plugged to brickwork</b>				
6.5.2.1		WD01  <b>Note: Tenderers are to refer to the attached Architects window schedules when pricing the items hereunder</b>  <b>Wispeco/similar standard aluminium window frame plugged to brickwork or concrete, complete with burglar bars</b>	No.	10.0		
6.5.2.2		AW01	No.	8.0		
6.5.2.3		AW02	No.	14.0		
6.5.2.4		<b>Tinted glass</b>  Allow for all external glass windows and doors to be tinted with 20%, 2-ply, non-reflective film	Sum	1.0		
6.5.2.5		Allow for glass awareness decals on all doors	Sum	1.0		
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.5: METALWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.5.3		<b>SHOWER CUBICLE DOORS</b>  KAL or equal approved classic pivot shower door, in natural anodised finish including frames, all fixed complete to walls including pointing with clear silicone all round both sides of frame				
6.5.3.1		Swing door, 900mm wide x 2,032mm high	No.	4.0		
6.5.4	<b>SANS 1200 H PSHA</b>	<b>STRUCTURAL STEEL</b>				
	<b>8.3.7</b>	<b>HANDRAILS</b>				
6.5.4.1		Removal of the existing handrails	m	80.0		
	<b>8.3.7 b)</b>	<b>Supply and install stainless steel handrail assembly complete with stanchions, bends and ends with chemical anchors</b>				
6.5.4.2	8.3.7 b) 1)	Horizontal (hand and knee rails)	m	80.0		
6.5.4.3	8.3.7 b) 2)	Sloping	m	10.0		
6.5.4.4	8.3.7 b) 3)	Shaped ends and bends	No.	8.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.6: PLASTERING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.6	PABR 5.3.1 PABR 2.1	<b>PLASTERING</b>				
6.6.1		<b>PRICES</b>  The prices of mouldings, weathering, skirting, labours, etc. shall include for forming mitres, stops, etc. unless otherwise described  The prices of all rendering shall include for working around pipes, balusters, etc  Rates for plaster are to include for all filling to and working around electrical conduits, etc., prior to plastering				
6.6.2		<b>SCREEDS</b>  Screeds steel trowelled to falls, on concrete				
6.6.2.1		1:3 cement plaster, 30mm min thick on floors and landings	m <sup>2</sup>	315.0		
6.6.3		<b>INTERNAL PLASTER</b>  One coat cement plaster on brickwork:				
6.6.3.1		Walls	m <sup>2</sup>	500.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.7: TILING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.7		<b>TILING</b>				
6.7.1		<b>SUPPLEMENTARY PREAMBLES</b>				
		<b>Rates for tiling must include for fixing, adhesive, anti-bacteria grout, sealing, wastage, profit, etc</b>				
6.7.2		<b>WALL TILING, ETC</b>				
		<b>Supply and fix tiles to match existing with supplier specified tile adhesive, applied with notched trowel, with flush pointed anti-bacteria 2mm grouting</b>				
		1. Materials (nett area) - R250 PC amount of R/m <sup>2</sup>				
		2. Proportion of rate adjustable related to PC amount (e.g.: waste, etc.) - R				
		3. Proportion of rate not adjustable (e.g.: labour, etc.) - R				
6.7.2.1		On walls (value to rate column)	m <sup>2</sup>	300.0		
6.7.3		<b>FLOOR TILING, ETC</b>				
		<b>Supply and fix tiles to match existing with supplier specified tile adhesive, applied with notched trowel, with flush pointed anti-bacteria 4mm grouting</b>				
		1. Materials (nett area) - R250 PC amount of R/m <sup>2</sup>				
		2. Proportion of rate adjustable related to PC amount (e.g.: waste, etc.) - R				
		3. Proportion of rate not adjustable (e.g.: labour, etc.) - R				
6.7.3.1		On floors	m <sup>2</sup>	152.0		
6.7.4		<b>SKIRTING, NOSING, ETC</b>				
		1. Materials (nett area) - R250 PC amount of R/m <sup>2</sup>				
		2. Proportion of rate adjustable related to PC amount (e.g.: waste, etc.) - R				
		3. Proportion of rate not adjustable (e.g.: labour, etc.) - R				
6.7.4.1		Tile skirting to match existing	m	200.0		
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.7: TILING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.7.5		<b>POLISH, SEALER, ETC</b>				
6.7.5.1		Two coats approved sealer on tile flooring	m <sup>2</sup>	152.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.8: PAINTING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.8		<b>PAINTING</b>				
6.8.1		<b>PREPARATORY WORK TO EXISTING WORK</b>  Previously painted plastered surfaces:  Surfaces shall be thoroughly washed down and allowed to dry completely before any paint is applied. Blistered or peeling paint shall be completely removed and cracks shall be opened, filled with a suitable filler and finished smooth  Previously painted metal surfaces:  Surfaces shall be thoroughly rubbed and cleaned down. Blistered or peeling paint shall be completely removed down to bare metal  Previously painted wood surfaces:  Surfaces shall be thoroughly cleaned down. Blistered or peeling paint shall be completely removed and cracks and crevices shall be primed, filled with suitable filler and finished smooth				
6.8.2		<b>PAINTWORK ETC TO PREVIOUSLY PAINTED WORK ON FLOATED PLASTER</b>  Prepare and brush surface to remove all loose contaminants and apply and two coats interior quality acrylic emulsion paint				
6.8.2.1		On existing internal walls	m <sup>2</sup>	225.0		
6.8.3		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL FLOATED PLASTERED SURFACES</b>  One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application				
6.8.3.1		On internal Walls	m <sup>2</sup>	245.0		
6.8.4		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL CEILING SURFACES</b>				
Total Carried Forward						



**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION**

**SECTION 6.8: PAINTING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.8.4.1		<b>One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application</b>  On ceiling of existing and new buildings	m²	152.00		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION**

**SECTION 6.9: SEWER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.9	SANS1200 LD, PSLD	<b>SEWER</b>				
		Ablution & Changeroom Facilities (Male & Female) & New Admin Building				
6.9.1		Supply and install associated sewer pipework and fittings for the sewer to the new Administration building, including modifications, new pipework/fittings and replacement of pipework and fittings to the Ablution and Changeroom facilities	Prov Sum	1.00	20,000.00	20,000.00
6.9.2		Overheads, charges and profit on above item 6.9.1	%	20,000.00		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.10: WATER SUPPLY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.10		<b>GENERAL ITEMS</b>				
		Ablution & Changeroom Facilities (Male & Female) & New Admin Building				
6.10.1		Supply and install associated pipework, valves and fittings for the water supply to the new Administration building, including modifications, new pipework/fittings and replacement of pipework, valves and fittings to the Ablution and Changeroom facilities	Prov Sum	1.00	25,000.00	25,000.00
6.10.2		Overheads, charges and profit on above item 6.10.1	%	0.00		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.11: PROVISIONAL SUMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.11		<b>PROVISIONAL SUMS</b>				
		Signage				
6.11.1		Supply and install signage	Prov Sum	1.0	10,000.00	10,000.00
6.11.2		Overheads, charges and profit on above item 6.11.1	%	10,000.0		
		Ablution & Changeroom Facilities (Male & Female) & Laboratory				
6.11.3		Supply and install wash hand basins and sinks	Prov Sum	1.0	20,000.00	20,000.00
6.11.4		Overheads, charges and profit on above item 6.11.3	%	20,000.0		
		Ablution & Changeroom Facilities (Male & Female)				
6.11.5		Supply and install toilets	Prov Sum	1.0	20,000.00	20,000.00
6.11.6		Overheads, charges and profit on above item 6.11.5	%	20,000.0		
		Ablution & Changeroom Facilities (Male & Female)				
6.11.7		Supply and install showers (hot and cold water)	Prov Sum	1.0	25,000.00	25,000.00
6.11.8		Overheads, charges and profit on above item 6.11.7	%	25,000.0		
	C5.2.6	Network Installation				
6.11.9		Supply and install fibre or equivalent network connection to the site	Prov Sum	1.0	50,000.00	50,000.00
6.11.10		Overheads, charges and profit on above item 6.11.9	%	50,000.0		
	PS9.13.4	<b>Fire reticulation, Fire Services, Fire Supplies and Fire Signage</b>				
6.11.11		Supply and install all fire reticulation, fire services, fire supplies and fire signage	Prov Sum	1.0	35,000.00	35,000.00
6.11.12		Overheads, charges and profit on above item 6.11.11	%	35,000.0		
		<b>Furniture for offices, labs, boardrooms, workshop, control room, and kitchen</b>				
Total Carried Forward						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION****SECTION 6.11: PROVISIONAL SUMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.11.13		Supply and install furniture for offices, labs, boardrooms, workshop, control room, and kitchen	Prov Sum	1.0	200,000.00	200,000.00
6.11.14		Overheads, charges and profit on above item 6.11.13	%	200,000.0		
		Associated stormwater works including pipework and fittings etc.				
6.11.15		Supply and install associated stormwater works	Prov Sum	1.00	25,000.00	25,000.00
6.11.16		Overheads, charges and profit on above item 6.11.15	%	25,000.00		
		Ancillary items				
6.11.17		Supply and install ancillary items	Prov Sum	1.00	50,000.00	50,000.00
6.11.18		Overheads, charges and profit on above item 6.11.17	%	50,000.00		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION**

## SECTION 6.12: GENERAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.12		<b>GENERAL ITEMS</b>				
6.12.1		<u>Temporary Offices for EWS Operators</u>				
6.12.1.1		Supply and maintenance of temporary on site airconditioned, insulated, furnished offices for the EWS Operators on site for the duration of the Contract (Including temporary ablution facilities)	Sum	1.0		
6.12.2		<b>GENERAL</b> Any other item the tenderer considers has been omitted and which requires pricing as separate items.				
6.12.2.1		i)	Sum	1.0		
6.12.2.2		ii)	Sum	1.0		
6.12.2.3		iii)	Sum	1.0		
Total Carried Forward To Summary						

**SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION**

## SUMMARY OF SECTIONS

SECTION	DESCRIPTION	AMOUNT (RAND)
6.1	SECTION 6.1: ALTERATIONS	
6.2	SECTION 6.2: CONCRETE, FORMWORK AND REINFORCING	
6.3	SECTION 6.3: MASONRY	
6.4	SECTION 6.4: WATERPROOFING	
6.5	SECTION 6.5: METALWORK	
6.6	SECTION 6.6: PLASTERING	
6.7	SECTION 6.7: TILING	
6.8	SECTION 6.8: PAINTING	
6.9	SECTION 6.9: SEWER	
6.10	SECTION 6.10: WATER SUPPLY	
6.11	SECTION 6.11: PROVISIONAL SUMS	
6.12	SECTION 6.12: GENERAL	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.1: SITE CLEARANCE**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.1	<b>SANS 1200 C, PSC &amp; PSDB</b>	<b>SITE CLEARANCE</b>				
		<b>All drawing references are prefixed with 60398/10</b>				
7.1.1		<b>SITE CLEARANCE</b>				
	<b>8.2.1, PSC 8.2.1</b>	<b>Clear and grub site</b>				
7.1.1.1	PSC 8.2.11	Saw Cutting of existing asphalt surfaces	m	15.0		
7.1.1.2	PSC8.2.13	Remove existing road asphalt and spoil at approved spoil disposal site for up to 60mm	m <sup>2</sup>	13.0		
	<b>8.2.4</b>	<b>Re-clear surfaces where directed by Engineer (Provisional)</b>				
7.1.1.3		Guard House site	m <sup>2</sup>	15.0		
7.1.1.4	8.2.10 PSC 8.2.10	Remove topsoil to depth of 150mm and stockpile	m <sup>3</sup>	4.0		
	<b>8.2.7, PSC 8.2.7</b>	<b>Existing Services</b>				
	<b>8.2.8</b>	<b>Demolish and remove structures/buildings and dismantle steelwork</b>				
7.1.1.5		Disconnect, dismantle as needed, and remove the guard hut.	No.	1.0		
Total Carried Forward To Summary						



**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.2: EARTHWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.2	<b>SANS 1200 D, PSD</b>	<b>EARTHWORKS</b>				
7.2.1	<b>8.3.3, PSD</b> <b>8.3.3(a), PSD</b> <b>2.3</b>	<b>RESTRICTED EXCAVATION</b>				
	<b>8.3.3 a), PSD</b> <b>8.3.5.2</b>	<b>Restricted excavation in all materials and stockpile suitable material and use for embankment or backfill, and dispose of unsuitable material to an approved spoil site to be determined by the contractor</b>				
7.2.1.1		Strip Footing	m <sup>3</sup>	9.0		
7.2.1.2		Septic Tank	m <sup>3</sup>	10.0		
7.2.2		<b>FOUNDATION PREPARATION</b>				
7.2.2.1		Compact bottom of excavation of in-situ material to 95% MOD AASHTO including testing	m <sup>2</sup>	16.0		
7.2.3		<b>BACKFILL</b>				
	<b>PSD 8.3.4.1</b>	<b>Selected backfill or fill material obtained from stockpile</b>				
7.2.3.1		Fill embankment compacted to 95% MOD AASHTO in 150mm layers including testing	m <sup>3</sup>	20.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.3: EARTHWORKS (PIPE TRENCHES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.3	<b>SABS1200 DB</b>	<b>EARTHWORKS (PIPE TRENCHES)</b>				
7.3.1	<b>PSDB 5.2 8.3.2</b>	<b>EXCAVATION</b>				
	8.3.2 (a) PSDB 8.3.2 (a)	<u>Excavate in all materials for pipe trenches, backfill, compact to specification and dispose of surplus/unsuitable material, for pipes:</u>  <i>Up to DN200 pipeline for a total trench depth</i>				
7.3.1.1		Up to 3.0m	m <sup>3</sup>	15.00		
	<u>8.3.2 (b) PSDB 8.3.2 (b)</u>	<u>Extra-over Item 7.3.1.1 for excavation in (All provisional):</u>				
7.3.1.2		1) Intermediate excavation	m <sup>3</sup>	5.00		
7.3.1.3		2) Hard rock excavation	m <sup>3</sup>	2.00		
7.3.1.4		3) Boulder Excavation class A (Provisional)	m <sup>3</sup>	1.00		
7.3.1.5		4) Boulder Excavation class B (Provisional)	m <sup>3</sup>	1.00		
7.3.1.6		Hand excavation and backfill where ordered by the Engineer (Provisional Quantity)	m <sup>3</sup>	5.00		
7.3.1.7	8.3.2 (c)	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m <sup>3</sup>	5.00		
7.3.1.8		Hand excavation to prove existing services (Provisional)	m <sup>3</sup>	5.00		
7.3.2	<b>8.3.3</b>	<b>EXCAVATION ANCILLARIES</b>				
		<u>Make up deficiency in backfill material (Provisional)</u>				
7.3.2.1	8.3.3.1 (a)	a) from other necessary excavations on site	m <sup>3</sup>	10.00		
7.3.2.2	8.3.3.1 (c)	b) by importation from commercial sources	m <sup>3</sup>	10.00		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.4: BEDDING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.4	<b>SABS 1200 LB</b>	<b>BEDDING (PIPES)</b>				
7.4.1	<u>PSLB 8.2.1</u>	<u>Provision of bedding from trench excavations:</u>				
7.4.1.1		Selected granular material for 200mm bedding cradle below pipe invert	m³	5.00		
7.4.1.2		Selected granular material for fill blanket to 300mm above pipe crown	m³	10.00		
7.4.1.3	PSLB 8.2.1.1	Extra Over for screening of material from the trench excavation, to achieve grading suitable to comply with the bedding and blanket material specification (Provisional Quantity)	m³	2.00		
7.4.2	<u>PSLB 8.2.2</u>	<u>Supply only of bedding by importation:</u>				
	PSLB 8.2.2.3	<i>From commercial sources:</i>				
7.4.2.1		a) Selected granular material for 200mm bedding cradle below pipe invert	m³	5.00		
7.4.2.2		b) Selected granular material for fill blanket to 300mm above pipe crown	m³	10.00		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.5	<b>SANS 1200 G, PSG</b>	<b>CONCRETE (STRUCTURAL)</b>				
7.5.1	<b>8.2</b>	<b>FORMWORK</b>				
	<b>8.2.1</b>	<b>Narrow Widths, Smooth finish from formwork on:</b>				
		<b>Vertical plane to</b>				
7.5.1.1		150mm high, roof slab	m	16.0		
7.5.1.2		150mm high, floor slab	m	13.0		
7.5.1.3		230mm high, footings	m	27.0		
7.5.1.4		75mm high, blinding layer	m	27.0		
7.5.1.5		100mm high, upstand beam	m	14.00		
		<b>Smooth finish from formwork on:</b>				
	<b>8.2.2, PSG</b>	<b>Horizontal plane to</b>				
	<b>8.2.2</b>					
	<b>PSG 5.2</b>					
7.5.1.6		Roof slab soffit	m <sup>2</sup>	21.0		
7.5.2	<b>8.3, PSG 8.1.2</b>	<b>REINFORCEMENT</b>				
	<b>8.3.1</b>	<b>Steel bars of various sizes</b>				
7.5.2.1		High-tensile steel bars	t	6.0		
7.5.2.2		Mild Steel Bars	t	0.60		
7.5.3	<b>8.4</b>	<b>CONCRETE</b>				
	8.4.2	<u>Grade Concrete (15 MPa/19mm):</u>				
7.5.3.1		Blinding layer minimum 75mm thick	m <sup>2</sup>	0.7		
	8.4.3, PSG 5.5	<b>Strength Concrete:</b>				
	8.4.3, PSG 5.5	<u>Grade Concrete (25 MPa/19mm):</u>				
7.5.3.2		85mm thick floor slab	m <sup>3</sup>	0.9		
7.5.3.3	<b>8.4.2</b>	<b>Grade concrete</b>	m <sup>3</sup>	4.0		
7.5.3.4		110mm thick footing (internal walls)	m <sup>3</sup>	1.0		
7.5.3.5		700mm wide footing	m <sup>3</sup>	3.0		
7.5.4	8.4.4	<b>UNFORMED SURFACE FINISHES</b>				
	8.4.4 (a)	<u>Steel-floated finish to:</u>				
Total Carried Forward						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.5.4.1	<b>8.4.4 a)</b>        <b>PSG 5.5.8, PSG 8.4.7</b>	<b>Slabs in grade 35MPa/26mm reinforced concrete</b>	m <sup>2</sup>	9.0		
7.5.4.2		Roof Slab	m <sup>2</sup>	21.0		
7.5.4.3		Floor Slab	m <sup>2</sup>	10.0		
7.5.5		<b>WATERPROOFING</b>				
		One layer of Derbigum SP (Special Polyester) waterproof sheeting sealed				
7.5.5.1		Top of the roof	m <sup>2</sup>	20.0		
		<u>Steel-floated finish to top of:</u>				
7.5.5.2		Roof slab	m <sup>2</sup>	20.0		
7.5.5.3		Floor slab	m <sup>2</sup>	9.0		
7.5.6		<b>CURING AND PROTECTION</b>				
7.5.6.1		Floor slabs	m <sup>2</sup>	9.0		
7.5.6.2		Roof slab	m <sup>2</sup>	20.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.6: METALWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.6	SANS 1200 H, PSHA, PACP	<b>METALWORK</b>				
7.6.1		<b>SUPPLEMENTARY PREAMBLES</b>  <p>The following to be finished with 25 microns powder coated, manufactured and installed in accordance with good building practice and in terms of the latest code of practice with revisions as recommended by SANS and AAAMSA</p> <p>Items shall be manufactured by an approved specialist who shall provide a sample upon request, for the Engineers approval</p> <p>Tenderers are advised to refer to the Architect's window and door schedules attached to these Bills of Quantities for details on drawing 60398/25</p> <p>Tenderers are to note that should there be any doubt or obscurity as to the meaning and intent of any descriptions, the Contractor must have the same rectified and allow for same accordingly in his tender. The Contractor is to include in his rates for all that he considers necessary for the proper construction of the windows and doors. No claims whatsoever will be afterwards admitted due to the Contractor having failed to comply with these conditions</p> <p>Rates shall include for the following:</p> <p>1. All opening and fixed lights, coupling mullions and transoms, support steelwork, fittings, ironmongery, etc., as required and specified.</p> <p>2. Complete glazing as described, with and including matching aluminium glazing beads and gaskets and glazed in accordance with the manufacturer's written instructions</p>				
Total Carried Forward						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.6: METALWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.6.2		<b>3. Building in and fixing into preformed openings. Window opening sizes to be verified on site before windows can be manufactured</b>  <b>4. Suitably protecting all exposed aluminium and glass surfaces with an approved protection tape and plastic sheeting. Such protection is to be removed at completion of the contract and the exposed surfaces cleaned down and left perfect. Under no circumstances will any damage whatsoever to the finished product be acceptable</b>  <b>5. Silicone pointing with a silicone sealant recommended by AAAMSA on all door / window and structure junctions</b>  <b>NATURAL ANODISED ALUMINIUM WINDOWS, DOORS, ETC.</b>  <b>Note: Tenderers are to refer to the Architects door schedules when pricing the items hereunder</b>  <b>Hardwood Meranti door frames plugged to brickwork</b>				
7.6.2.1		WD01  <b>Note: Tenderers are to refer to the attached Architects window schedules when pricing the items hereunder</b>  <b>Wispeco/similar standard aluminium window frame plugged to brickwork or concrete, complete with burglar bars</b>	No.	2.0		
7.6.2.2		AW01	No.	2.0		
7.6.2.3		AW02	No.	1.0		
7.6.2.4		AW03	No.	1.00		
7.6.2.5		<b>Tinted glass</b>  Allow for all external glass windows and doors to be tinted with 20%, 2-ply, non-reflective film	Sum	1.0		
Total Carried Forward						

SCHEDULE 7 - SECURITY GUARD HOUSE

SECTION 7.6: METALWORK

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.6.2.6		Allow for glass awareness decals on all doors	Sum	1.0		
Total Carried Forward To Summary						



**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.7: MASONRY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.7	SANS 1200 H, PSAHA, PACP	<b>MASONRY</b>  <b>SUPPLEMENTARY PREAMBLES:</b>  <b>Sizes in descriptions</b>  Where sizes in descriptions are given in brick units, 'one brick' shall represent the length and 'half brick' the width of a brick.  <b>Hollow walls, etc</b>  Descriptions of hollow walls shall be deemed to include leaving every fifth perpend of the bottom course of the external skin open as a weep hole.  Walls in two skins described as 'bagged and sealed' shall be deemed to include having the outer face of the inner skin bagged with 1:6 cement and sand mixture  <b>Face bricks</b>  Bricks shall be ordered timeously to obtain uniformity in size and colour  <b>Pointing</b>  Descriptions of recessed pointing to fair face brickwork and face brickwork shall be deemed to include square recessed, hollow recessed, weathered pointing, etc.				
7.7.1	PABR	<b>BRICKWORK IN SUPERSTRUCTURE</b>  In mortar class according to PABR 2.6:  <b>Proposed Guard House</b>  <b>New external one brick walls in Roan Satin FBX facebrick skin externally with common NFP brick skin internally to be plastered and painted (measured elsewhere)</b>				
7.7.1.1		External facebrick skin	m <sup>2</sup>	35.0		
7.7.1.2		Internal common brick skin	m <sup>2</sup>	35.0		
Total Carried Forward						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.7: MASONRY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.7.1.3	PABR	<b>New internal walls in common NFP brickwork to be plastered and painted (measured elsewhere)</b>  Single skin wall	m²	5.0		
7.7.2		<b>BRICKWORK SUNDRIES</b>  <b>Brick on edge lintels</b>				
7.7.2.1		110 x 150mm lintels in lengths not exceeding 3m	m	6.0		
7.7.2.2		110 x 150mm sills in lengths not exceeding 3m	m	5.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.8: PLASTERING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.8	PABR 5.3.1 PABR 2.1	<b>PLASTERING</b>				
7.8.1		<b>PRICES</b>  The prices of mouldings, weathering, skirting, labours, etc. shall include for forming mitres, stops, etc. unless otherwise described  The prices of all rendering shall include for working around pipes, balusters, etc  Rates for plaster are to include for all filling to and working around electrical conduits, etc., prior to plastering				
7.8.2		<b>INTERNAL PLASTER</b>  One coat cement plaster on brickwork:				
7.8.2.1		Walls	m <sup>2</sup>	32.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.9: PAINTING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.9		<b>PAINTING</b>				
7.9.1		<b>PREPARATORY WORK TO EXISTING WORK</b>  Previously painted plastered surfaces:  Surfaces shall be thoroughly washed down and allowed to dry completely before any paint is applied. Blistered or peeling paint shall be completely removed and cracks shall be opened, filled with a suitable filler and finished smooth  Previously painted metal surfaces:  Surfaces shall be thoroughly rubbed and cleaned down. Blistered or peeling paint shall be completely removed down to bare metal  Previously painted wood surfaces:  Surfaces shall be thoroughly cleaned down. Blistered or peeling paint shall be completely removed and cracks and crevices shall be primed, filled with suitable filler and finished smooth				
7.9.2		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL FLOATED PLASTERED SURFACES</b>  One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application				
7.9.2.1		On internal Walls	m <sup>2</sup>	32.0		
7.9.3		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL CEILING SURFACES</b>  One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application				
7.9.3.1		On ceiling of existing and new buildings	m <sup>2</sup>	10.00		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.10: PROVISIONAL SUMS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.10		<b>PROVISIONAL SUMS</b>				
		Signage				
7.10.1		Supply and install signage	Prov Sum	1.0	5,000.00	5,000.00
7.10.2		Overheads, charges and profit on above item 7.10.1	%	5,000.0		
		Guard House wash hand basins and sinks				
7.10.3		Supply and install wash hand basins and sinks	Prov Sum	1.0	5,000.00	5,000.00
7.10.4		Overheads, charges and profit on above item 7.10.3	%	5,000.0		
		Guard House ablution facilities				
7.10.5		Supply and install toilets	Prov Sum	1.0	7,500.00	7,500.00
7.10.6		Overheads, charges and profit on above item 7.10.5	%	7,500.0		
		Guard House water supply				
7.10.7		Supply and install water supply	Prov Sum	1.0	10,000.00	10,000.00
7.10.8		Overheads, charges and profit on above item 7.10.7	%	10,000.0		
	C5.2.6	Sewer Installation				
7.10.9		Supply and install sewer connection and associated works	Prov Sum	1.0	10,000.00	10,000.00
7.10.10		Overheads, charges and profit on above item 7.10.9	%	10,000.0		
		<b>Furniture for Guard House</b>				
7.10.11		Supply and install furniture for offices, labs, boardrooms, workshop, control room, and kitchen	Prov Sum	1.0	15,000.00	15,000.00
7.10.12		Overheads, charges and profit on above item 7.10.11	%	15,000.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE****SECTION 7.11: GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7.11		<b>GENERAL ITEMS</b>				
7.11.1		<b>SIGNAGE</b>				
7.11.1.1		Supply and install signage as directed by the Engineer	Prov Sum	1.0	15,000.00	15,000.00
7.11.1.2		Overheads, charges and profit on above item 7.11.1.1	%	15,000.0		
7.11.2		<b>GENERAL</b>  <b>Any other item the tenderer considers has been omitted and which requires pricing as separate items.</b>				
7.11.2.1		i)	Sum	1.0		
7.11.2.2		ii)	Sum	1.0		
7.11.2.3		iii)	Sum	1.0		
Total Carried Forward To Summary						

**SCHEDULE 7 - SECURITY GUARD HOUSE**

## SUMMARY OF SECTIONS

SECTION	DESCRIPTION	AMOUNT (RAND)
7.1	SECTION 7.1: SITE CLEARANCE	
7.2	SECTION 7.2: EARTHWORKS	
7.3	SECTION 7.3: EARTHWORKS (PIPE TRENCHES)	
7.4	SECTION 7.4: BEDDING	
7.5	SECTION 7.5: CONCRETE (STRUCTURAL)	
7.6	SECTION 7.6: METALWORK	
7.7	SECTION 7.7: MASONRY	
7.8	SECTION 7.8: PLASTERING	
7.9	SECTION 7.9: PAINTING	
7.10	SECTION 7.10: PROVISIONAL SUMS	
7.11	SECTION 7.11: GENERAL	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.1: SITE CLEARANCE

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.1	<b>SANS 1200 C, PSC &amp; PSDB</b>	<b>SITE CLEARANCE</b>				
		<b>All drawing references are prefixed with 60398/02 - 60398/09</b>				
8.1.1		<b>DN250 In-Situ Chamber</b>				
8.1.1.1	PSC8.2.11	Saw cutting of existing asphalt surface	m	27.0		
8.1.1.2	PSC8.2.13	Remove existing road asphalt surfacing and spoil at approved spoil disposal site up to 60mm thickness	m <sup>2</sup>	3.0		
8.1.2		<b>DN80 Residue Sludge Disposal</b>				
8.1.2.1	8.2.1, PSC 8.2.1	Clear and Grub Site	m <sup>2</sup>	19.0		
8.1.3		<b>DN100 IV Precast Concrete Chamber</b>				
8.1.3.1	8.2.1, PSC 8.2.1	Clear and Grub Site	m <sup>2</sup>	23.0		
8.1.4	8.2.10, PSC 8.2.10	Remove topsoil to depth of 150mm and stockpile for all chamber	m <sup>3</sup>	10.0		
Total Carried Forward To Summary						



**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.2: EARTHWORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.2	<b>SANS 1200 D, PSD</b>	<b>EARTHWORKS</b>				
8.2.1	<b>8.3.3, PSD 8.3.3(a), PSD 2.3</b>	<b>RESTRICTED EXCAVATION</b>				
	<b>8.3.3 a), PSD 8.3.5.2</b>	<b>Restricted excavation in all materials and stockpile suitable material and use for embankment or backfill, and dispose of unsuitable material to an approved spoil site to be determined by the contractor</b>				
8.2.1.1		DN250 In-Situ Chamber	m <sup>3</sup>	94.0		
8.2.1.2		DN80 Residue Sludge Disposal	m <sup>3</sup>	22.0		
8.2.1.3		DN100 IV Precast Concrete Chamber	m <sup>3</sup>	28.0		
	<b>8.3.3 b), PSD 3.1</b>	<b>Extra-over items «3.2.2.1» to «3.2.2.3» for:</b>				
8.2.1.4	8.3.3 b) 1)	Intermediate material	m <sup>3</sup>	70.0		
8.2.1.5	8.3.3 b) 2)	Hard rock material	m <sup>3</sup>	10.0		
8.2.1.6	8.3.3 b) 3)	Boulder material, Class A (Provisional)	m <sup>3</sup>	5.0		
8.2.1.7	8.3.3 b) 4)	Boulder material, Class B (Provisional)	m <sup>3</sup>	5.0		
8.2.2	<b>8.3.3 a)</b>	<b>FOUNDATION PREPARATION</b>				
8.2.2.1		Rip & re-compact in-situ material to 98% MOD AASHTO in 150mm layers	m <sup>3</sup>	10.0		
8.2.3		<b>BACKFILL</b>				
	<b>PSD 8.3.4.1</b>	<b>Selected backfill or fill material obtained from stockpile</b>				
8.2.3.1		Fill embankment around chambers compacted to 95% MOD AASHTO in 150mm layers including testing	m <sup>3</sup>	75.0		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.3: EARTHWORKS (PIPE TRENCHES)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.3	<b>SABS1200 DB</b>	<b>EARTHWORKS (PIPE TRENCHES)</b>				
8.3.1	<b>PSDB 5.2</b>	<b>EXCAVATION</b>				
	<b>8.3.2</b>					
	8.3.2 (a) PSDB	Excavate in all materials for pipe trenches, backfill, compact to specification and dispose of surplus/unsuitable material, for pipes:				
	8.3.2 (a)	Up to DN400 pipeline for a total trench depth				
8.3.1.1		Up to 3.0m	m <sup>3</sup>	120.00		
	8.3.2 (b) PSDB	Extra-over Item 8.3.1.1 for excavation in (All provisional):				
	8.3.2 (b)					
8.3.1.2		1) Intermediate excavation	m <sup>3</sup>	60.00		
8.3.1.3		2) Hard rock excavation	m <sup>3</sup>	10.00		
8.3.1.4		3) Boulder Excavation class A (Provisional)	m <sup>3</sup>	5.00		
8.3.1.5		4) Boulder Excavation class B (Provisional)	m <sup>3</sup>	5.00		
8.3.1.6		Hand excavation and backfill where ordered by the Engineer (Provisional Quantity)	m <sup>3</sup>	10.00		
8.3.1.7	8.3.2 (c)	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m <sup>3</sup>	10.00		
8.3.1.8		Hand excavation to prove existing services (Provisional)	m <sup>3</sup>	10.00		
8.3.2	<b>8.3.3</b>	<b>EXCAVATION ANCILLARIES</b>				
		Make up deficiency in backfill material (Provisional)				
8.3.2.1	8.3.3.1 (a)	a) from other necessary excavations on site	m <sup>3</sup>	50.00		
8.3.2.2	8.3.3.1 (c)	b) by importation from commercial sources	m <sup>3</sup>	50.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.4: CONCRETE (STRUCTURAL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.4	SABS 1200 G	<b>CONCRETE (STRUCTURAL)</b>				
8.4.1	8.2	<b>FORMWORK</b>				
	8.2.2 PSG8.2.2	<u>Smooth Vertical Plane to:</u>				
8.4.1.1		Chamber walls	m <sup>2</sup>	65.00		
	8.2.2 PSG8.2.2	<u>Smooth Horizontal Plane to:</u>				
8.4.1.2		Chamber roof	m <sup>2</sup>	11.00		
	8.2.5	<u>Narrow Widths, smooth vertical plane, for:</u>				
8.4.1.3		75mm high, vertical face to chamber wall kicker	m	15.00		
8.4.1.4		300mm high, vertical face for chamber floor slab	m	15.00		
8.4.1.5		200mm high, vertical side for chamber access lids	m	15.00		
8.4.1.6		200mm high, vertical face for chamber upstand beams	m	15.00		
8.4.1.7		200mm high, vertical face to chamber roof openings	m	10.00		
8.4.1.8		200m high, vertical face to pump plinth	m	30.00		
	8.2.5	<u>Narrow Widths, smooth horizontal plane, for:</u>				
8.4.1.9		100mm wide, horizontal face to chamber roof openings	m	10.00		
8.4.2		<b>FORMWORK SUNDRIES</b>				
	8.2.6 PSG 8.2.6	<u>Box out holes or form voids in:</u>				
	8.2.6 (a)	<i>Thickness up to and including for small, circular diameters up to and including 300mm.</i>				
8.4.2.1	8.2.6 (a)	0m - 0,5m thick	No.	10.00		
	8.2.6 (c)	<i>Thickness up to and including for large, circular diameters from 300mm to 800mm.</i>				
8.4.2.2	8.2.6 (c)	0m - 0,5m thick	No.	4.00		
	8.2.6 (d)	<i>Thickness up to and including for large, other shapes, area 0,1 - 0,5 m<sup>2</sup></i>				
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.4: CONCRETE (STRUCTURAL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.4.2.3	8.2.6 (d)	0m - 0,5m thick	No.	4.00		
8.4.3	8.3 PSG 8.1.2	<b>REINFORCEMENT</b>				
8.4.3.1	8.3.1	Mild steel bars	t	0.30		
8.4.3.2	8.3.1	High-tensile steel bars	t	3.00		
8.4.3.3	8.3.2	High-tensile weld mesh	m <sup>2</sup>	15.00		
8.4.4	8.4	<b>CONCRETE</b>				
	8.4.2 PSG 5.5	<u>Grade Concrete (15 Mpa/19mm):</u>				
8.4.4.1		Blinding layer minimum 75mm thick for below chambers	m <sup>3</sup>	2.00		
	8.4.3 PSG 5.5	<u>Strength Concrete - Grade Concrete (25 Mpa/19mm):</u>				
8.4.4.2		Chamber floors	m <sup>3</sup>	6.00		
8.4.4.3		Chamber walls	m <sup>3</sup>	10.00		
8.4.4.4		Chamber Roof	m <sup>3</sup>	2.00		
8.4.4.5		Pump Plinths	m <sup>3</sup>	10.00		
	8.4.3 PSG 5.5 PSG 8.4.7	<u>Strength Concrete - Grade Concrete (25 Mpa/19mm) complete, for:</u>				
8.4.4.6		Removable chamber lids for chambers	m <sup>3</sup>	6.00		
8.4.5	8.4.4 PSG 5.2.1	<b>UNFORMED SURFACE FINISHES</b>				
	8.4.4 (a)	<u>Wood-floated finish to:</u>				
8.4.5.1		Blinding	m <sup>2</sup>	20.00		
	8.4.4 (b)	<u>Steel-floated finish to:</u>				
8.4.5.2		Top of chamber walls	m <sup>2</sup>	5.00		
8.4.5.3		Top of Chamber Roof Slab	m <sup>2</sup>	8.00		
8.4.5.4		Top of Chamber Floor Slab	m <sup>2</sup>	12.00		
8.4.5.5		Top of pump plinth	m <sup>2</sup>	30.00		
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.4: CONCRETE (STRUCTURAL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.4.6	8.5 5.5.7 PSG 5.5.7	<b>JOINTS</b>				
8.4.6.1		Seal between concrete roof slabs and walls of chamber with approved Bitumen seal putty	m	20.00		
8.4.6.2		Seal chamber base to wall construction joint on external face with approved 100mm wide bitumen waterproof bandage	m	15.00		
8.4.6.3		Seal chamber wall to roof construction joint on external face with approved 100mm wide bitumen waterproof bandage	m	15.00		
8.4.6.4		Plug 75mm-100mm dia lifting holes x 200mm deep in chamber roof slabs with approved Bitumen seal putty	No.	4.00		
8.4.7	SABS 1200L 8.2.13	<b>PRECAST VALVE CHAMBERS AND MANHOLES</b>  <u>The following rates are to include for the supply and installation of all ladders, sealing joints, water proof bandaging joints, air vents, handrails, access manholes &amp; frames, GRP landings, ladders &amp; gratings, air vents and crushed stone. All in situ and pre-cast concrete, foundations, crushed stone layers, shuttering, surface finishing, curing of concrete and ancillaries to be included and rate supplied to be for complete functional unit.</u>				
8.4.7.1		Supply and install Residue Meter Chambers COMPLETE with related items as per Dwg 60398/19, for depths up to 4,0m	No.	8.00		
8.4.7.2		Supply and install DN100 IV Chambers COMPLETE with related items as per Dwg 60398/17, for depths up to 4,0m	No.	2.00		
8.4.8		<b>CASTING IN</b>				
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.4: CONCRETE (STRUCTURAL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.4.8.1	PSG 8.10	<u>Supply all labour, plant and materials for casting of fabricated pipe specials into concrete walls of all thicknesses and wrapping with "Denso 1250/300" Tape wrapping system 600mm long to manufacturer's specifications (puddle flange not to be wrapped) inclusive for forming formwork around pipes and fixing pipes to the designated lines and levels, for:</u>  up to DN300	No.	8.00		
8.4.8.2		<u>Supply all labour, plant and materials for casting in, inclusive of forming formwork around items and fixing to the designated lines and levels, for:</u>  Air vents in chamber as per Detail on Dwg 60398/46	No.	2.00		
8.4.8.3		75mm-100mm dia lifting holes cast into roof slab as per detail on Dwg 60398/21	No.	16.00		
8.4.9		<b>MISCELLANEOUS</b>  <u>Supply all labour, plant and materials and wrap circumference of steel pipeline with "Denso 1250/300" Tape wrapping where ordered by the Engineer, for:</u>				
8.4.9.1		up to DN300	m	10.00		
8.4.9.2		Paint chamber roof slabs with 2 coats of white road marking paint including stenciling of chamber description in black	m²	15.00		
8.4.9.3		Paint chamber walls where above ground with 2 coats of white road marking paint	m²	30.00		
8.4.9.4		Core through existing reinforced concrete wall for backwash recovery pipework, inclusive of grouting and waterproofing	No.	2.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.5: MEDIUM PRESSURE PIPELINES (STEEL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.5	SABS 1200 L	<b>MEDIUM PRESSURE PIPELINES (STEEL)</b>				
8.5.1	PSL 8.2.1	<b>SUPPLY, LAY AND BED PIPE</b>  <u>Rate is inclusive of checking for holidays of external coating and internal lining if applicable, jointing of pipe in accordance with the project specification, for:</u>				
8.5.1.1	PSL 8.2.1	DN100 to DN200 Steel 4.5mm thick X42	m	50.00		
8.5.1.2	PSL 8.2.1	DN 250 to 400 Steel 4.5mm thick X42	m	50.00		
8.5.2		<b>PREPARATION AND WELDING OF JOINTS IN X42 GRADE STEEL PIPE</b>  <u>Rate is inclusive NDT testing of joints and reinstatement at the joint for external coating and internal lining damage in accordance with the project specification.</u>				
	PSL 8.2.22	<u>Preparation and welding of bell ended joint:</u>				
8.5.2.1		DN100 to 400, 4.5mm thick	No.	10.00		
	PSL 8.2.23	<u>Preparation and welding of single mitred joints (Provisional):</u>				
8.5.2.2		DN100 to 400, 4.5mm thick	No.	8.00		
	PSL 8.2.24	<u>Preparation and welding of collar/ band welded joints (Provisional):</u>				
8.5.2.3		DN100 to 400, 4.5mm thick	No.	2.00		
	PSL 8.2.25	<u>Preparation of X42 grade steel pipe by means of cutting where directed by the Engineer (provisional quantity):</u>				
8.5.2.4		DN100 to 400, 4.5mm thick	No.	3.00		
8.5.3		<b>PIPE FITTINGS</b>				
	PSL 8.2.2	<u>Extra-over Item above for fabrication and installation of following specials:</u>				
	PSL 3.4.4.2	<i>Manufacturing of Simple and Compound Bends complete and install inclusive of cutting, welding, testing, reinstatement of external coating and internal lining, transportation and handling, for:</i>				
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.5: MEDIUM PRESSURE PIPELINES (STEEL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.5.3.1	PSL 3.4.4.2	DN100 to 400, 4.5mm thick, X42, for: greater than 0 to 15 deg	No.	3.00		
8.5.3.2		greater than 15 to 30 deg	No.	2.00		
8.5.3.3		greater than 30 to 45 deg	No.	2.00		
8.5.3.4		greater than 45 to 60 deg	No.	2.00		
8.5.3.5		greater than 60 to 75 deg	No.	2.00		
8.5.3.6		greater than 75 to 90 deg	No.	2.00		
8.5.3.7	PSL 3.4.4.2	Supply Shop Drawings for fabricated steel segmented bends for approval	No.	13.00		
		<u>Supply and install the following steel slip on pipe flanges:</u>  <i>Rate to include cutting of pipes, joint preparation, welding, NDT testing of joints and reinstatement at the joint for external coating and internal lining damage complete in accordance with the project specification.</i>				
8.5.3.8		SANS 1123 - Table 1600/3 (PN16): DN100 to 400, 4.5mm thick	No.	10.00		
		<u>Supply and install the following steel blank flanges:</u>  SANS 1123 - Table 1600/3 (PN16):				
8.5.3.9	PSL 3.9	DN100 to 400, 4.5mm thick	No.	10.00		
8.5.4		<b>REPAIR:</b>  <u>Repair, as result of damage inflicted by pipe supplier, external "3 Layer Polyethylene" coating complete inclusive of labour, materials, plant, supervision and QA/QC for defects:</u>				
8.5.4.1		DN100 to 400, 4.5mm thick	m	60.00		
8.5.4.2		from 501mm² to 750mm² in area	Prov No.	10.00		
8.5.4.3		from 751m² to 1000mm² in area	Prov No.	5.00		
8.5.4.4		from 1001mm² to 1400mm² in area	Prov No.	5.00		
Total Carried Forward						



**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.5: MEDIUM PRESSURE PIPELINES (STEEL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.5.4.5	PSL 7.3  PSL 7.3 PSL 8.2.21	<u>Repair, as a result of damage inflicted by pipe supplier, internal cement mortar lining, complete inclusive of labour, plant, materials, supervision and QA/QC for defects for:</u> up to 200mm <sup>2</sup> in area	Prov No.	10.00		
8.5.4.6		from 201mm <sup>2</sup> to 400mm <sup>2</sup> in area	Prov No.	10.00		
8.5.4.7		from 401mm <sup>2</sup> to 600mm <sup>2</sup> in area	Prov No.	10.00		
8.5.4.8		from 600mm <sup>2</sup> to 800mm <sup>2</sup> in area	Prov No.	5.00		
8.5.4.9		from 800mm <sup>2</sup> to 1000mm <sup>2</sup> in area	Prov No.	5.00		
8.5.4.10		Repair inside lining and outside coating in terms of the specification, as a result of thermal welding conducted by employers corrosion specialist, to attach a monitoring cable to the crown of the pipe.	Prov No.	10.00		
8.5.5		<b>HYDRAULIC TESTING</b>				
		<u>End cap, filling, testing and disinfection of pipelines inclusive of specials in chambers within sections as per specification, for:</u>				
8.5.5.1		All diameter's of pipework when necessary	m	250.00		
8.5.6		<b>MISCELLANEOUS</b>				
8.5.6.1		Cleaning of internal surfaces of pipeline where instructed by the Engineer	m	50.00		
		<u>Supply all labour, plant and materials and install the following:</u>				
8.5.6.2		Up to DN400 insulating flanges (inclusive of all sleeves and bolts)	No.	10.00		
		<u>Paint all above ground pipework as per specification with an approved UV stable overcoat</u>				
8.5.6.3		Up to DN400	m	10.00		
8.5.7		<b>TIE INS</b>				
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.5: MEDIUM PRESSURE PIPELINES (STEEL)

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		<u>Undertake the following tie-ins including the removal of sufficient existing pipe to make way for new pipework, arranging shut-downs with eThekweni Municipality operations staff, cleaning and preparing the pipes for cutting, removal of blank flange, dealing with all water (including that from leaking valves), preparing the pipe ends for jointing, re-commissioning the pipeline and making good on site including all temporary supports. (All new pipes, valves and fittings that are required are measured elsewhere), for:</u>				
8.5.7.1		Metcalf System	No.	1.00		
8.5.7.2		Tongaath South System	No.	1.00		
8.5.7.3		Hambanathi System	No.	1.00		
8.5.7.4		Mamba Ridge Back-feed system	No.	1.00		
8.5.7.5		Backwash Recovery System	No.	1.00		
8.5.7.6		Residue Disposal System	No.	1.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.6	<b>SANS 1200 L, PSL</b>	<b>PIPEWORK ASSEMBLIES</b>  <u>Fabricate, supply and install valves, spool pieces, fittings and bends complete inclusive of all collar/ crotch plate reinforcing with internal and external coating as per specifications. Rates to include for all bolts, nuts, gaskets and jointing material, testing, holiday detection, radiographic inspection of field welds, preparation for welding where required and the repair and making good of all linings and coatings. All rates to be inclusive of UV protective coating where pipework is above ground.</u>				
8.6.1	8.2.5 PSL 8.2.5	<b>BLOWER PIPEWORK COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/03</b>  All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.1.1		Item A01	No.	3.00		
8.6.1.2		Item A02	No.	1.00		
8.6.1.3		Item A03	No.	2.00		
8.6.1.4		Item A04	No.	1.00		
8.6.1.5		Item A05	No.	1.00		
8.6.1.6		Item A06	No.	1.00		
8.6.1.7		Item A07	No.	1.00		
8.6.1.8		Item A08	No.	1.00		
8.6.1.9		Item A09	No.	1.00		
8.6.1.10		Item A10	No.	1.00		
8.6.1.11		Item A11	No.	2.00		
8.6.1.12		Item A12	No.	1.00		
8.6.1.13		Item A13	No.	1.00		
8.6.1.14		Item A14	No.	1.00		
8.6.1.15		Item A15	No.	1.00		
8.6.1.16		Item A16	No.	14.00		
8.6.1.17		Item A17	No.	1.00		
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.6.1.18	8.2.5 PSL 8.2.5	Item A18	No.	5.00		
8.6.1.19		Item A19	No.	6.00		
8.6.1.20		Item A20	No.	6.00		
8.6.1.21		Item A21	No.	6.00		
8.6.1.22		Item A22	No.	5.00		
8.6.1.23		Item A23	No.	1.00		
8.6.2		<b>BACKWASH RECOVERY ASSEMBLY COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/05</b>				
		All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.2.1		Item B01	No.	2.00		
8.6.2.2		Item B02	No.	2.00		
8.6.2.3		Item B03	No.	1.00		
8.6.2.4		Item B04	No.	1.00		
8.6.2.5		Item B05	No.	1.00		
8.6.2.6		Item B06	No.	1.00		
8.6.2.7		Item B07	No.	2.00		
8.6.2.8		Item B08	No.	2.00		
8.6.2.9		Item B09	No.	2.00		
8.6.2.10		Item B10	No.	2.00		
8.6.2.11		Item B11	No.	1.00		
8.6.2.12		Item B12	No.	1.00		
8.6.2.13		Item B13	No.	1.00		
8.6.2.14		Item B14	No.	1.00		
8.6.2.15		Item B15	No.	1.00		
8.6.2.16		Item B16	No.	1.00		
8.6.2.17		Item B17	No.	1.00		
8.6.2.18		Item B18	No.	1.00		
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.6.2.19	8.2.5 PSL 8.2.5	Item B19	No.	2.00		
8.6.2.20		Item B20	No.	1.00		
8.6.3		<b>BACKWASH PIPEWORK ASSEMBLY COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/04</b>				
		All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.3.1		Item D01	No.	3.00		
8.6.3.2		Item D02	No.	4.00		
8.6.3.3		Item D03	No.	1.00		
8.6.3.4		Item D04	No.	3.00		
8.6.3.5		Item D05	No.	3.00		
8.6.3.6		Item D06	No.	3.00		
8.6.3.7		Item D07	No.	3.00		
8.6.3.8		Item D08	No.	3.00		
8.6.3.9		Item D09	No.	3.00		
8.6.3.10		Item D10	No.	3.00		
8.6.3.11		Item D11	No.	1.00		
8.6.3.12		Item D12	No.	2.00		
8.6.3.13		Item D13	No.	1.00		
8.6.3.14		Item D14	No.	7.00		
8.6.3.15		Item D15	No.	1.00		
8.6.3.16		Item D16	No.	4.00		
8.6.3.17		Item D17	No.	3.00		
8.6.3.18		Item D18	No.	1.00		
8.6.3.19		Item D19	No.	1.00		
8.6.3.20		Item D20	No.	1.00		
8.6.3.21		Item D22	No.	1.00		
8.6.3.22		Item D23	No.	1.00		
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.6.3.23		Item D24	No.	6.00		
8.6.3.24		Item D25	No.	6.00		
8.6.3.25		Item D26	No.	6.00		
8.6.3.26		Item D27	No.	6.00		
8.6.3.27		Item D28	No.	5.00		
8.6.3.28		Item D29	No.	5.00		
8.6.3.29		Item D30	No.	5.00		
8.6.3.30		Item D31	No.	5.00		
8.6.3.31		Item D32	No.	1.00		
8.6.3.32		Item D33	No.	1.00		
8.6.3.33		Item D34	No.	1.00		
8.6.3.34		Item D35	No.	1.00		
8.6.3.35		Item D36	No.	1.00		
8.6.3.36		Item D37	No.	1.00		
8.6.3.37		Item D38	No.	1.00		
8.6.3.38		Item D39	No.	1.00		
8.6.3.39		Item D40	No.	12.00		
8.6.3.40		Item D41	No.	12.00		
8.6.3.41		Item D42	No.	23.00		
8.6.3.42		Item D43	No.	12.00		
8.6.3.43		Item D44	No.	12.00		
8.6.3.44		Item D45	No.	1.00		
8.6.3.45		Item D46	No.	7.00		
8.6.3.46		Item D47	No.	4.00		
8.6.3.47		Item D48	No.	4.00		
8.6.3.48		Item D49	No.	1.00		
8.6.3.49		Item D50	No.	1.00		
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.6.4	8.2.5 PSL 8.2.5	<b>DN250 ISOLATION VALVE CHAMBER ASSEMBLY COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/06</b>  All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.4.1		Item 1	No.	1.00		
8.6.4.2		Item 2	No.	3.00		
8.6.4.3		Item 3	No.	3.00		
8.6.4.4		Item 4	No.	1.00		
8.6.4.5		Item 5	No.	1.00		
8.6.4.6		Item 6	No.	1.00		
8.6.4.7		Item 7	No.	1.00		
8.6.4.8		Item 8	No.	1.00		
8.6.4.9		Item 9	No.	1.00		
8.6.4.10		Item 10	No.	1.00		
8.6.4.11		Item 11	No.	1.00		
8.6.4.12		Item 12	No.	1.00		
8.6.4.13		Item 13	No.	1.00		
8.6.4.14		Item 14	No.	2.00		
8.6.4.15		Item 15	No.	1.00		
8.6.4.16		Item 16	No.	2.00		
8.6.4.17		Item 17	No.	1.00		
8.6.4.18		Item 18	No.	2.00		
8.6.4.19		Item 19	No.	1.00		
8.6.4.20		Item 20	No.	1.00		
8.6.4.21		Item 21	No.	1.00		
8.6.4.22		Item 22	No.	1.00		
8.6.5	8.2.5 PSL 8.2.5	<b>RESIDUE DISPOSAL SYSTEM ASSEMBLY COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/08</b>				
Total Carried Forward						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.5.1		Item 1	No.	2.00		
8.6.5.2		Item 2	No.	2.00		
8.6.5.3		Item 3	No.	2.00		
8.6.5.4		Item 4	No.	2.00		
8.6.5.5		Item 5	No.	2.00		
8.6.5.6		Item 6	No.	1.00		
8.6.5.7		Item 7	No.	1.00		
8.6.5.8		Item 8	No.	1.00		
8.6.5.9		Item 9	No.	1.00		
8.6.5.10		Item 10	No.	1.00		
8.6.5.11		Item 11	No.	4.00		
8.6.5.12		Item 12	No.	2.00		
8.6.5.13		Item 13	No.	2.00		
8.6.5.14		Item 14	No.	2.00		
8.6.5.15		Item 15	No.	2.00		
8.6.5.16		Item 16	No.	2.00		
8.6.5.17		Item 17	No.	2.00		
8.6.5.18		Item 18	No.	2.00		
8.6.5.19		Item 19	No.	2.00		
8.6.5.20		Item 20	No.	4.00		
8.6.5.21		Item 21	No.	4.00		
8.6.5.22		Item 22	No.	1.00		
8.6.5.23		Item 23	No.	1.00		
8.6.5.24		Item 24	No.	1.00		
8.6.5.25		Item 25	No.	1.00		
8.6.5.26		Item 26	No.	1.00		
8.6.5.27		Item 27	No.	2.00		
Total Carried Forward						



**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.6: PIPEWORK ASSEMBLIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
8.6.5.28		Item 28	No.	1.00		
8.6.6	8.2.5 PSL 8.2.5	<b>DN100 ISOLATION VALVE (RESIDUE DISPOSAL AND BACKWASH RECOVERY CROSS CONNECTION) ASSEMBLY COMPLETE, PN16 UNLESS OTHERWISE STATED AS PER DWG 60398/07</b>  All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
8.6.6.1		Item 1	No.	1.00		
8.6.6.2		Item 2	No.	1.00		
8.6.6.3		Item 3	No.	2.00		
8.6.6.4		Item 4	No.	1.00		
8.6.6.5		Item 5	No.	4.00		
8.6.6.6		Item 6	No.	1.00		
8.6.6.7		Item 7	No.	1.00		
8.6.6.8		Item 8	No.	1.00		
8.6.6.9		Item 9	No.	1.00		
8.6.6.10		Item 10	No.	1.00		
8.6.6.11		Item 11	No.	1.00		
8.6.6.12		Item 12	No.	1.00		
8.6.6.13		Item 13	No.	1.00		
8.6.6.14		Item 14	No.	1.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.7: BEDDING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.7	<b>SABS 1200 LB</b>	<b>BEDDING (PIPES)</b>				
8.7.1	<u>PSLB 8.2.1</u>	<u>Provision of bedding from trench excavations:</u>				
8.7.1.1		Selected granular material for 200mm bedding cradle below pipe invert	m³	30.00		
8.7.1.2		Selected granular material for fill blanket to 300mm above pipe crown	m³	50.00		
8.7.1.3	PSLB 8.2.1.1	Extra Over for screening of material from the trench excavation, to achieve grading suitable to comply with the bedding and blanket material specification (Provisional Quantity)	m³	10.00		
8.7.2	<u>PSLB 8.2.2</u>	<u>Supply only of bedding by importation:</u>				
	PSLB 8.2.2.3	<i>From commercial sources:</i>				
8.7.2.1		a) Selected granular material for 200mm bedding cradle below pipe invert	m³	30.00		
8.7.2.2		b) Selected granular material for fill blanket to 300mm above pipe crown	m³	50.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.8: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.8	SABS 1200 HA PSHA	<b>STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP</b>				
8.8.1		<b>ACCESS LADDERS AND LANDINGS</b>				
8.8.1.1		Supply all labour, plant and materials and install STAINLESS STEEL LADDERS complete for chambers including stringers and rungs, chemical anchors, bolts, nuts and washers and cut to suit required length and bolted in place as per Detail on 60398/48	m	4.00		
8.8.1.2		Supply all labour, plant and materials and install STAINLESS STEEL SAFETY CAGE for access ladder complete for chambers, cut to suit required length and bolted in place as per Dwg 60398/48	m	2.00		
8.8.2		<b>HANDRAILS</b>				
8.8.2.1		Supply and install top mounted STAINLESS STEEL Handrail assembly complete with stanchions, bends and ends with chemical anchors for chamber access hatches as per Detail C on Dwg 60398/46	No.	1.00		
8.8.3		<b>SUNDRY ITEMS</b>				
		<u>Fabricate, supply all labour, plant and materials and install the following:</u>				
8.8.3.1		Hot Dipped Galvanised air vent as per Air Vent Detail on 60398/46	No.	2.00		
		<u>Stainless pipe support steel straps/brackets complete with neoprene etc as per Dwg 60398/16 for:</u>				
8.8.3.2		DN100 to DN300	No.	6.00		
8.8.3.3		Supply and install Type 5 valve cover (Cast into roof slab)	No.	4.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.9: STORMWATER

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.9	SABS 1200LE	<b>STORMWATER DRAINAGE</b>				
8.9.1	8.2.1 PSLE8.2.1	<b>PIPES</b>				
8.9.1.1		Supply and Install 110mm NB heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	50.00		
8.9.2	8.2.10	<b>ACCESSORIES</b>				
8.9.2.1		Install stormwater head wall for chambers as directed by engineer on site as per Detail 1 on DWG 60398/16	No.	4.00		
8.9.2.2		Construct french drain with 150mm dump rock completely wrapped in geotextile (Bidem A4 or similar approved) as directed by the Engineer.	m³	20.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SECTION 8.10: GENERAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8.10		<b>GENERAL ITEMS</b>				
8.10.1		<b>Signage</b>				
8.10.1.1		Supply and install signage as directed by the Engineer	Prov Sum	1.0	15,000.00	15,000.00
8.10.1.2		Overheads, charges and profit on above item 8.10.1.1	%	15,000.0		
8.10.2		<b>Removal and Replacement of Backwash, Blower and Residue Disposal Pipework, Valves, Equipment and fittings</b>				
8.10.2.1		Decommissioning and safe removal of pipework and associated fittings	Sum	1.00		
8.10.2.2		Supply and installation of temporary pipe supports and associated temporary support works (including scaffolding and access platforms) required to ensure the safe removal of existing pipework, valves and fittings etc.	Sum	1.00		
8.10.2.3		Transportation of all removed pipework, valves, fittings, equipment to to EWS Depot	Sum	1.00		
8.10.2.4		Installation of temporary systems determined by the Contractor to ensure the continuous operation of the works. Temporary works designs are to be submitted to the Employers Agent for approval prior to proceeding with the removal of equipment	Sum	1.00		
8.10.2.5		Allowance for associated blank flanges and isolation valves to be utilised temporarily by the Contractor to isolate associated systems	Sum	1.00		
8.10.2.6		Provisional Sum for inverted U bend on blower pipework and all associated pipe supports to be determined by the Contractor, inclusive of supply, installation, miscellaneous works, pipework drawings, design and associated documentation	Prov Sum	1.00	25,000.00	25,000.00
8.10.2.7		Overheads, charges and profit on above item 8.10.1.1	%	25,000.00		
Total Carried Forward To Summary						

**SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS**

## SUMMARY OF SECTIONS

SECTION	DESCRIPTION	AMOUNT (RAND)
8.1	SECTION 8.1: SITE CLEARANCE	
8.2	SECTION 8.2: EARTHWORKS	
8.3	SECTION 8.3: EARTHWORKS (PIPE TRENCHES)	
8.4	SECTION 8.4: CONCRETE (STRUCTURAL)	
8.5	SECTION 8.5: MEDIUM PRESSURE PIPELINES (STEEL)	
8.6	SECTION 8.6: PIPEWORK ASSEMBLIES	
8.7	SECTION 8.7: BEDDING	
8.8	SECTION 8.8: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP	
8.9	SECTION 8.9: STORMWATER	
8.10	SECTION 8.10: GENERAL	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 9 - CLARIFIERS****SECTION 9.1: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
9.1	<b>SANS 1200 H, PSAHA, PACP</b>	<b>STRUCTURAL STEELWORK</b>				
9.1.1	<b>PSHA 8.3</b>	<b>SUPPLY AND FABRICATION</b>				
9.1.1.1	8.3.1.1	Preparation of shop detail drawings	t	12.3		
	8.3.1.2	<b>Supply and fabrication of steelwork in S355JR steel complete with all necessary cleats, brackets, gussets, base plates, packs, grade 8.8 bolts, holes, welding, shaping, etc.</b>				
9.1.1.2		Beams over clarifiers	t	0.4		
9.1.1.3		Walkway over clarifiers	t	2.4		
9.1.2	<b>PSHA 8.3</b>	<b>DELIVERY</b>				
9.1.2.1	8.3.2.1	Normal load	t	3.0		
9.1.3	<b>PSHA 8.3</b>	<b>ERECTION</b>				
9.1.3.1	8.3.3	Offloading, stacking on site, and erection of steelwork	t	3.0		
9.1.4	<b>PSHA 8.3</b>	<b>SITE WELDING</b>				
9.1.4.1	8.3.5	Site weld walkway items as appropriate	m	60.0		
9.1.5	<b>PSHA 8.3</b>	<b>HANDRAILS</b>				
	8.3.7 b)	<b>Supply, apply corrosion protection, paint, and install steel handrail assembly complete with stanchions, bends and ends with chemical anchors to detail on dwg 60398/12</b>				
9.1.5.1	8.3.7 b) 1)	Horizontal (hand and knee rails)	m	200.0		
9.1.5.2	8.3.7 b) 2)	Sloping	m	50.0		
9.1.5.3	8.3.7 b) 3)	Shaped ends and bends	No.	40.0		
9.1.5.4		Allow for a life saving floatation device to be mounted on handrailing. To include mounting and life saving device	No.	3.0		
9.1.6	<b>PSHA 8.3</b>	<b>WALKWAYS</b>				
	8.3.9	<b>Open grid floors in S355JR steel including access hatch as indicated on drawing 60398/12</b>				
Total Carried Forward						

**SCHEDULE 9 - CLARIFIERS****SECTION 9.1: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
9.1.6.1		Design, prepare shop detail drawings, supply all materials, apply corrosion protection, and install, open grated walkway and steps complete over clarifiers and fixed to concrete with anchors	Sum	1.0		
Total Carried Forward To Summary						



**SCHEDULE 9 - CLARIFIERS****SECTION 9.2: OTHER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
9.2		<b>OTHER</b>				
9.2.1		Provisional sum for the design, supply, associated ancillary works and installation of new pipework within Clarifiers, including associated supports and brackets achored to clarifier walls.	Prov Sum	1.00	250,000.00	250,000.00
9.2.2		Overheads & profit on above item	%	250,000.00		
9.2.3		Provisional sum for the design, supply, associated ancillary works and installation of brickwork within main inlet channel, including associated achorage to channel walls.	Prov Sum	1.00	10,000.00	10,000.00
9.2.4		Overheads & profit on above item	%	10,000.00		
9.2.5		Provisional sum for the design, supply, associated ancillary works and installation of an overflow from the clear water reservoir to the backwash recovery tank.	Prov Sum	1.00	75,000.00	75,000.00
9.2.6		Overheads & profit on above item	%	75,000.00		
9.2.7	SANS1200H PSH	Design, supply and install steel walkway above raw water channel between clarifiers inclusive of associated supports, frame, coating and ancillary works	m <sup>2</sup>	45.00		
Total Carried Forward To Summary						

**SCHEDULE 9 - CLARIFIERS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
9.1	SECTION 9.1: STRUCTURAL STEELWORK	
9.2	SECTION 9.2: OTHER	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 10 - BACKWASH RECOVERY TANK****SECTION 10.1: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
10.1	SABS 1200 H	<b>STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP</b>				
10.1.1		<b>SUNDRY ITEMS</b>				
10.1.1.1		Supply and install steel staircase next to tank 1000mm high	No.	1.00		
10.1.1.2		Design, supply and install steel walkway above backwash recovery tank inclusive of associated supports, frame, coating and ancillary works (3300mm x 21600mm)	m <sup>2</sup>	80.00		
Total Carried Forward To Summary						

**SCHEDULE 10 - BACKWASH RECOVERY TANK**

**SECTION 10.2: OTHER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
10.2		<b>OTHER</b>				
10.2.1		Provisional sum for increase in overflow from backwash recovery tank	Prov Sum	1.00	15,000.00	15,000.00
10.2.2		Overheads and Profit on the above item	%	15,000.00		
Total Carried Forward To Summary						

**SCHEDULE 10 - BACKWASH RECOVERY TANK****SECTION 10.3: PIPEWORK ASSEMBLIES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
10.3	<b>SANS 1200 L, PSL</b>	<b>PIPEWORK ASSEMBLIES</b>  <u>Fabricate, supply and install valves, spool pieces, fittings and bends complete inclusive of all collar/ crotch plate reinforcing with internal and external coating as per specifications. Rates to include for all bolts, nuts, gaskets and jointing material, testing, holiday detection, radiographic inspection of field welds, preparation for welding where required and the repair and making good of all linings and coatings.</u>				
10.3.1	8.2.5 PSL 8.2.5	<b>DN100 DRAINAGE PIPEWORK FROM FILTER PLENUM</b>  All flanges to be supplied and as per SANS 1123 Table 1600/3 unless otherwise shown or specified				
10.3.1.1		DN100 Wedge Gate Valve PN16 with hand wheel and extended spindle	No.	6.0		
10.3.1.2		DN100 90 degree (ANSI) B16.9 long radius bend with 300mm long spool piece welded to one end and other end flanged, flange to match valve (Final Lengths to be determined on site)	No.	6.0		
Total Carried Forward To Summary						

**SCHEDULE 10 - BACKWASH RECOVERY TANK****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
10.1	SECTION 10.1: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP	
10.2	SECTION 10.2: OTHER	
10.3	SECTION 10.3: PIPEWORK ASSEMBLIES	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 11 - ROADS****SECTION 11.1: EARTHWORKS (ROADS, SUBGRADE)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
11.1	SABS 1200 DM	<b>EARTHWORKS</b>				
11.1.1		<b>ROAD-BED PREPARATION</b>				
	8.3.3 (a)	<u>Road-bed preparation and compaction of material to:</u>				
11.1.1.1	8.3.3 (a) (1)	Compact to 93% MOD AASHTO maximum density	m <sup>3</sup>	100.00		
11.1.2		<b>EARTHWORKS</b>				
	8.3.4	<u>Cut to fill</u>				
11.1.2.1		Compact to 93% MOD AASHTO maximum density	m <sup>3</sup>	110.00		
	8.3.4	<u>Borrow to fill</u>				
11.1.2.2		Compact to 93% MOD AASHTO maximum density	m <sup>3</sup>	50.00		
	8.3.7	<u>Cut to spoil (Provisional):</u>				
11.1.2.3	8.3.7(a)	a) Soft excavation	m <sup>3</sup>	160.00		
11.1.2.4	8.3.7(b)	b) Intermediate excavation	m <sup>3</sup>	150.00		
11.1.2.5	8.3.7(c)	c) Hard excavation	m <sup>3</sup>	10.00		
Total Carried Forward To Summary						

**SCHEDULE 11 - ROADS****SECTION 11.2: ROAD REINSTATEMENT**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
11.2		<b>ACCESS ROAD REINSTATEMENT</b>				
11.2.1	SABS 1200 ME PSME	<b>SELECTED LAYER/SUBBASE</b>				
11.2.1.1		Construct 200mm thick G7 subbase course with material from commercial sources and compact to 95% MOD AASHTO	m³	130.00		
11.2.2	SABS 1200 MF PSMF	<b>BASE/ WEARING COURSE</b>				
11.2.2.1	8.3.3	Construct 100mm thick G2 base course with material from commercial sources and compact to 98% MOD AASHTO	m³	70.00		
Total Carried Forward To Summary						



**SCHEDULE 11 - ROADS****SECTION 11.3: SURFACING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
11.3	SANS 1200MH	<b>SURFACING</b>				
11.3.1	SANS 1200 MH PSMH	<b>ASPHALT SURFACING</b>  <u>Continuously medium graded asphalt surfacing using 35/50 Pen. Grade bitumen:</u>				
11.3.1.1	PSMH 8.5.4	40mm to roads	m <sup>2</sup>	650.00		
11.3.1.2	8.5.1	Prime Coat (MC30 cutback bitumen)	m <sup>2</sup>	650.00		
11.3.1.3	8.5.3 PSMH 3.3	Tack coat	m <sup>2</sup>	650.00		
Total Carried Forward To Summary						

**SCHEDULE 11 - ROADS****SECTION 11.4: CONCRETE KERBING AND CHANNELLING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
11.4	SANS 1200 MK	<b>CONCRETE KERBING AND CHANNELLING</b>				
11.4.1		<b>KERBING</b>				
	8.2.1	<u>Fig 6 barrier kerb and cast insitu 25Mpa filler/ channel complete as per detail with continuous 120 x 100mm haunch, for:</u>				
11.4.1.1		Straight kerbing and radii in excess of 20m	m	260.00		
11.4.1.2		Radii that are greater than 4.0m - 20m in radius	m	50.00		
11.4.1.3		Radii that are greater than 1.0m - 4.0m in radius (Provisional Quantity)	m	25.00		
11.4.2	8.2.6	<b>ANCILLARIES</b>				
		<u>Cast in-situ transitions:</u>				
11.4.2.1	8.2.6.2	Concrete, specified strength 25MPa complete with formwork and reinforcing mesh	m <sup>3</sup>	20.00		
Total Carried Forward To Summary						

**SCHEDULE 11 - ROADS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
11.1	SECTION 11.1: EARTHWORKS (ROADS, SUBGRADE)	
11.2	SECTION 11.2: ROAD REINSTATEMENT	
11.3	SECTION 11.3: SURFACING	
11.4	SECTION 11.4: CONCRETE KERBING AND CHANNELLING	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 12 - STORMWATER****SECTION 12.1: STORMWATER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
12.1	SABS 1200LE	<b>STORMWATER DRAINAGE</b>				
12.1.1		<b>PIPES</b>				
		<u>Supply and lay stormwater drainage pipes for the following:</u>				
12.1.1.1	PSLE 8.2.1	Supply and Install up to 110mm NB heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	50.00		
12.1.1.2	PSLE 8.2.1	Supply and Install 160mm NB heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	30.00		
12.1.1.3	PSLE 8.2.1	Supply and Install 200 to 350mm NB heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	30.00		
12.1.2		<b>ACCESSORIES</b>				
12.1.2.1	PSLE 8.2.15	Install stormwater chambers inclusive of grating or MH cover as directed by engineer on site as per Dwg 60398/46	No.	8.00		
12.1.2.2	PSLE 8.2.16	Install stormwater head wall for stormwater outlets as directed by engineer on site as per Dwg 60398/46(All sizes)	No.	4.00		
12.1.2.3		Supply and construct 570mm wide Kalvis Type 01 water channel inclusive of all jointing and ground preparation for straight sections. Rate inclusive of grating.	m	50.00		
12.1.2.4		Supply and construct 650mm wide Kalvis Type 02 water channel inclusive of all jointing and ground preparation for straight sections.	m	50.00		
12.1.2.5		Supply and construct 1000mm x 570mm x 300mm Kalvis Type 01 water channel inclusive of all jointing and ground preparation for straight sections and inclusive of GMS grating.	m	50.00		
Total Carried Forward To Summary						

**SCHEDULE 12 - STORMWATER****SECTION 12.2: EARTHWORKS (PIPE TRENCHES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
12.2	<b>SABS1200 DB</b>	<b>EARTHWORKS (PIPE TRENCHES)</b>				
12.2.1	<b>PSDB 5.2 8.3.2</b>	<b>EXCAVATION</b>				
	8.3.2 (a) PSDB 8.3.2 (a)	<u>Excavate in all materials for pipe trenches, backfill, compact to specification and dispose of surplus/unsuitable material, for pipes:</u>  <i>Up to DN350 pipeline for a total trench depth</i>				
12.2.1.1		Up to 3.0m	m <sup>3</sup>	150.00		
	8.3.2 (b) PSDB 8.3.2 (b)	<u>Extra-over Item 12.2.1.1 for excavation in (All provisional):</u>				
12.2.1.2		1) Intermediate excavation	m <sup>3</sup>	50.00		
12.2.1.3		2) Hard rock excavation	m <sup>3</sup>	20.00		
12.2.1.4		3) Boulder Excavation class A (Provisional)	m <sup>3</sup>	5.00		
12.2.1.5		4) Boulder Excavation class B (Provisional)	m <sup>3</sup>	5.00		
12.2.1.6		Hand excavation and backfill where ordered by the Engineer (Provisional Quantity)	m <sup>3</sup>	10.00		
12.2.1.7	8.3.2 (c)	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m <sup>3</sup>	10.00		
12.2.1.8		Hand excavation to prove existing services (Provisional)	m <sup>3</sup>	10.00		
12.2.2	<b>8.3.3</b>	<b>EXCAVATION ANCILLARIES</b>				
		<u>Make up deficiency in backfill material (Provisional)</u>				
12.2.2.1	8.3.3.1 (a)	a) from other necessary excavations on site	m <sup>3</sup>	50.00		
12.2.2.2	8.3.3.1 (c)	b) by importation from commercial sources	m <sup>3</sup>	50.00		
Total Carried Forward To Summary						

**SCHEDULE 12 - STORMWATER****SECTION 12.3: BEDDING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
12.3	<b>SABS 1200 LB</b>	<b>BEDDING (PIPES)</b>				
12.3.1	PSLB 8.2.1	<u>Provision of bedding from trench excavations:</u>				
12.3.1.1		Selected granular material for 200mm bedding cradle below pipe invert	m³	15.00		
12.3.1.2		Selected granular material for fill blanket to 300mm above pipe crown	m³	25.00		
12.3.1.3	PSLB 8.2.1.1	Extra Over for screening of material from the trench excavation, to achieve grading suitable to comply with the bedding and blanket material specification (Provisional Quantity)	m³	10.00		
12.3.2	PSLB 8.2.2	<u>Supply only of bedding by importation:</u>				
	PSLB 8.2.2.3	<i>From commercial sources:</i>				
12.3.2.1		a) Selected granular material for 200mm bedding cradle below pipe invert	m³	15.00		
12.3.2.2		b) Selected granular material for fill blanket to 300mm above pipe crown	m³	25.00		
Total Carried Forward To Summary						

**SCHEDULE 12 - STORMWATER****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
12.1	SECTION 12.1: STORMWATER	
12.2	SECTION 12.2: EARTHWORKS (PIPE TRENCHES)	
12.3	SECTION 12.3: BEDDING	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 13 - MISCELLANEOUS WORKS****SECTION 13.1: SITE CLEARANCE**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13.1	SANS 1200 C, PSC	<b>SITE CLEARANCE</b>				
13.1.1		<b>CLEAR SITE</b>				
	8.2.1	<u>Clear and grub:</u>				
13.1.1.1		Water Treatment Works site	m <sup>2</sup>	500.00		
	8.2.4 PSC 8.2.4	<u>Re-clear surfaces where directed by Engineer (Provisional):</u>				
13.1.1.2		Water Treatment Works site	m <sup>2</sup>	50.00		
13.1.2		<b>REMOVE TOPSOIL AND OTHER SURFACES</b>				
	8.2.10 PSC 8.2.10	<u>Remove topsoil, stockpile, maintain and dispose of surplus to nominal depth of 150mm, for:</u>				
13.1.2.1		Fill embankments and designated areas	m <sup>3</sup>	20.00		
	PSC 8.2.11	<u>Saw cutting of existing asphalt of thickness:</u>				
13.1.2.2		30 - 60mm	m	50.00		
13.1.2.3	PSC 8.2.13	Remove existing road asphalt surfacing and spoil at approved disposal sites (25 to 45mm thickness)	m <sup>2</sup>	150.00		
	PSC 8.2.14	<u>Remove existing gravel layer works to spoil</u>				
13.1.2.4		Gravel and crushed stone layer works to roads	m <sup>3</sup>	30.00		
	PSC 8.2.18	<u>Remove along edges of road, driveways and footway channel (provisional quantity):</u>				
13.1.2.5		a) All pre-cast concrete kerbing and channelling	m	20.00		
Total Carried Forward To Summary						



**SCHEDULE 13 - MISCELLANEOUS WORKS****SECTION 13.2: GABIONS AND PITCHING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13.2	SANS 1200 DK	<b>GABIONS AND PITCHING</b>				
13.2.1	8.2.1	<b>SURFACE PREPARATION</b> <u>Surface preparation for bedding:</u>				
13.2.1.1	8.2.1(a)	Cavities filled with approved excavated material or rock (Provisional Quantity)	m <sup>2</sup>	15.00		
13.2.1.2	8.2.1(b)	Cavities filled with 15MPa concrete	m <sup>2</sup>	15.00		
13.2.2	PSDK 8.2.8	<b>EXCAVATION</b> <u>Excavate in all materials, backfill, compact, and dispose of surplus/unsuitable material:</u>				
13.2.2.1		For gabions and reno mattress baskets	m <sup>3</sup>	10.00		
13.2.3	PSDK 3.1.2	<b>GABIONS</b> <u>Supply and Construct gabions complete with hand rock using double twisted hexagonal mesh type 80 with 3.4mm OD frame wire and 2.7mm OD mesh wire to SANS 1580:2005 coated in Galfan (provisional quantities), for:</u>				
13.2.3.1		Reno Mattresses of depth 0,3 m with diaphragms providing 2,0 m x 1,0 m cells	m <sup>3</sup>	6.00		
13.2.3.2		Gabions of section 2,0 m x 1,0 m x 0,5m high	m <sup>3</sup>	10.00		
13.2.3.3		Gabions of section 2,0 m x 1,0 m x 1,0m high	m <sup>3</sup>	30.00		
13.2.4	8.2.4, PSDK 8.2.4	<b>GEOTEXTILE (GRADE A4)</b>				
13.2.4.1		Supply and install below gabions and reno mattress baskets	m <sup>2</sup>	15.00		
13.2.5	8.2.5	<b>STONE PITCHING</b>				
13.2.5.1		Stone pitching with 150mm dump rock, grouted, where directed by the Engineer	m <sup>3</sup>	10.00		
Total Carried Forward To Summary						

**SCHEDULE 13 - MISCELLANEOUS WORKS****SECTION 13.3: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13.3	SABS 1200 G	<b>CONCRETE (STRUCTURAL)</b>				
13.3.1		<b>MISCELLANEOUS</b>				
		<u>Concrete retaining block walling inclusive of concrete base 15Mpa, subsoil drain and geotextile :</u>				
13.3.1.1		a) Terraforce Blok or similar approved - Retaining Blocks L300	m <sup>2</sup>	20.00		
13.3.1.2		b) Loffelstein or similar approved L500 blocks	m <sup>2</sup>	20.00		
13.3.1.3		c) Loffelstein or similar approved L750 blocks	m <sup>2</sup>	20.00		
Total Carried Forward To Summary						

**SCHEDULE 13 - MISCELLANEOUS WORKS****SECTION 13.4: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13.4	SABS 1200 H	<b>STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP</b>				
13.4.1		<b>FENCING</b>				
13.4.1.1		Supply and install double leaf entrance gate complete as per details on EWS Drawing 45004. (Rate to include for supply, fabricate and installation)	No.	2.00		
13.4.2		<b>HANDRAILS</b>				
13.4.2.1		Supply and install top/side mounted Stainless Steel Handrail assembly complete with stanchions, bends and ends with chemical anchors	m	50.00		
Total Carried Forward To Summary						

**SCHEDULE 13 - MISCELLANEOUS WORKS****SECTION 13.5: OTHER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13.5		<b>OTHER</b>				
13.5.1		Provisional sum for painting of above ground pipework with UV stable coating	Prov Sum	1.00	100,000.00	100,000.00
13.5.2		Overheads and Profit on the above item	%	100,000.00		
13.5.3		Provisional sum for coating/painting of existing pipework within the TWTW site for ease of identification.	Prov Sum	1.00	100,000.00	100,000.00
13.5.4		Overheads and Profit on the above item	%	100,000.00		
Total Carried Forward To Summary						

**SCHEDULE 13 - MISCELLANEOUS WORKS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
13.1	SECTION 13.1: SITE CLEARANCE	
13.2	SECTION 13.2: GABIONS AND PITCHING	
13.3	SECTION 13.3: CONCRETE (STRUCTURAL)	
13.4	SECTION 13.4: STRUCTURAL STEELWORK (SUNDRY ITEMS) AND GRP	
13.5	SECTION 13.5: OTHER	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.1: MECHANICAL & PUMP INSTALLATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
14.1	PSWPE	<b>MECHANICAL EQUIPMENT AND ANCILLARY WORKS</b>  <u>Note : All pump pipework, valves, fittings and associated equipment are measured elsewhere</u>  <u>Design , supply , manufacture , deliver , offload , install , connect up, test and commission, guarantee and maintaining the pumping plant and associated equipment to EWS standards and to the relevant SANS, BS or other recognised codes and standards</u>				
14.1.1		Carry out an audit and assessment on the existing Backwash Pumps and associated motors and provide a detailed report on findings and remedial works required for the Engineers approval.	Sum	1.00		
		<u>Make safe, disconnect, remove, lift or load , transport and deliver the existing pump sets, motors and associated equipment to EWS Stores and offload as follows :</u>				
14.1.1.1		a) Existing Backwash Recycle Pump	No.	1.00	125.00	125.00
14.1.1.2		b) Existing sludge pumps - submersible type	No.	2.00		
14.1.1.3		c) Existing sampling pumps	No.	2.00		
14.1.2	PS WPE 6, 7, 8, 9 & 10	<u>Design, manufacture , supply and deliver the following new pump sets ( to replace existing ) :</u>				
14.1.2.1		a) Self priming backwash recycle pump ( excluding motor ) , base , coupling , coupling guards, mounting / support frame, belts etc including all sensors as specified complete ( 1 duty, and 1 stand-by ) - duty 55m³/hr @ 5,8m head as specified.	No.	2.0		
14.1.2.2		b) Submersible sludge pump with motor , coupling , guide rail etc including all sensors as specified complete ( 1 duty, and 1 stand-by ) - duty 34m³/hr @ 6,5m head as specified and supplied by KSB type Amarex NF80-220 or similar and equal approved	No.	2.00		
14.1.3		<u>Install, connect up etc the new pump sets supplied above as follows :</u>				
Total Carried Forward						

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.1: MECHANICAL & PUMP INSTALLATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
14.1.3.1		a) Backwash recycle pump	No.	2.00		
14.1.3.2		b) Sludge pump	No.	2.00		
14.1.3.3		c) Allow for laser alignment for the self priming backwash recycle pumps supplied above ( provide certificates )	No.	2.00		
14.1.4		Allow for the FAT for the above pumps ( backwash recycle pumps and sludge pumps )	Sum	1.00		
14.1.5		Allow for the Engineer and Client to attend the FAT for the above pumps ( to include for flights, travel, car hire , accommodation, meals , entertainment etc ) . Allowance to be made for 3 persons	Sum	1.00		
14.1.6		<u>Supply, install and connect up the following ancillary equipment :</u>				
14.1.6.1		a) Wika or similar pressure gauges 0 - 500kPA complete with piping, backing board etc	No	1.0		
14.1.6.2		b) Wika or similar pressure gauges 0 - 1000kPA complete with piping, backing board etc	No	4.00		
14.1.6.3		c) ½" BSP sockets with stop-cocks welded on steel pipework	No	8.00		
14.1.6.4		d) Electronic pressure transmitters and sensors 0-1000kPA pressure rating	No	2.00		
14.1.7		<u>SAT - Test and commission the following pump sets on site as supplied above :</u>				
14.1.7.1		a) Backwash Recycle Pump	No	2.00		
14.1.7.2		b) Sludge Pump	No	2.00		
14.1.8		<u>Design and submit layout drawings of the pump sets and pipework &amp; valve details and layout drawings for each of the pump systems as follows :</u>				
14.1.8.1		a) Backwash Recycle Pump	Sum	1.0		
14.1.8.2		b) Sludge Pump	Sum	1.00		
Total Carried Forward						

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.1: MECHANICAL & PUMP INSTALLATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
14.1.8.3		Design and submit technical specifications and detailed dimensioned drawings for all the pump sets supplied above	Sum	1.00		
Total Carried Forward To Summary						



**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.2: MOTORS & ANCILLARY WORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
14.2	PS WPE 6 , 7 , 8 & 9	<b>MOTORS &amp; ANCILLARY WORKS</b>				
14.2.1		<u>Supply the following WEG or similar approved 525V motors as specified.</u>				
14.2.1.1		Self priming backwash recovery pump	No.	2.0		
14.2.2		<u>Install new 525V motors in position including all new galvanised bolts, nuts, washers and relevant ancillary components</u>				
14.2.2.1		Self priming backwash recovery pump	No.	2.0		
14.2.3		<u>Connect all motors to the respective pump couplings (couplings/belt drives to be provided with pump)</u>				
14.2.3.1		Self priming backwash recovery pump	No.	2.0		
14.2.4		<u>Testing and commissioning of new motors. The commissioning of all new motors are to be completed in conjunction with the MCC and equipment testing. (To be undertaken in accordance with the Contractors commissioning plan)</u>				
14.2.4.1		Self priming backwash recovery pump	No.	2.0		
14.2.5		Testing and Commissioning data sheets to be provided for all motors including a summary report	Sum	1.0		
Total Carried Forward To Summary						

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.3: ELECTRIC ACUATORS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
14.3	PS ACT1.1 to PS ACT1.16	<b>ELECTRIC ACTUATORS</b>  <u>Manufacture , supply, deliver , off-load and install the following electrical valve actuators as specified and in accordance with the EWS specifications and standards as follows :</u>				
14.3.1		<b>CLARIFIERS - DESLUDGE VALVES</b>				
14.3.1.1		a) Electric actuators to fit DN100 resilient seal gate valves ( torque requirement to suit valve )	No	6.0		
14.3.1.2		b) Electric actuators to fit DN350 resilient seal gate valves ( torque requirement to suit valve )	No	1.0		
14.3.1.3		c) Deliver the above electric actuators to the valve supplier for fitting of the actuators to the valves	No	7.0		
14.3.2		<b>FILTERS - BACKWASH &amp; AIR BLOWER VALVES</b>				
14.3.2.1		d) Electric actuators to fit DN200 resilient seal gate valves ( torque requirement to suit valve )	No	6.0		
14.3.2.2		e) Electric actuators to fit DN300 resilient seal gate valves ( torque requirement to suit valve )	No	6.0		
14.3.2.3		f) Electric actuators to fit DN350 resilient seal gate valves ( torque requirement to suit valve )	No	6.0		
14.3.2.4		g) Deliver the above electric actuators to the valve supplier for fitting of the actuators to the valves	No	6.0		
14.3.3		Assist the civil or pipework contractor to fit all the above valve actuators and valves to their respective pipework and connect up	Sum	1.0		
14.3.4		Provide labelling to all the valve actuators supplied above	Sum	1.0		
14.3.5		Allow an amount for the FAT for all the above electric valve actuators :	Sum	1.0		
Total Carried Forward						

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SECTION 14.3: ELECTRIC ACUATORS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
14.3.6		Allow for the Engineer and Client to attend the FAT for all the above electric valve actuators ( to include for flights, travel, car hire , accommodation, meals , entertainment etc ) . Allowance to be made for 3 persons	Sum	1.0		
14.3.7		SAT - Test and commission all the electric valve actuators supplied and installed as above	Sum	1.0		
14.3.8		Provide training for the EWS Tongaat WTW Plant operations and maintenance staff for the entire WTW and pumping and actuator systems	Sum	1.0		
14.3.9		Provide all labels and signs for all the above pumps	Sum	1.0		
14.3.10		Allow a provisional sum of R 100 000,00 for any unforeseen work the amounts of which are to be used entirely at the discretion of the Engineer and Client	Prov Sum	1.0		
14.3.11		Allow for profit and attendance on provisional sum above	%	100,000.0		
14.3.12		Any other items the tenderer considers has been omitted and which requires separate pricing as follows :  a)  b)				
Total Carried Forward To Summary						

**SCHEDULE 14: MECHANICAL EQUIPMENT & ANCILLARY WORKS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
14.1	SECTION 14.1: MECHANICAL & PUMP INSTALLATIONS	
14.2	SECTION 14.2: MOTORS & ANCILLARY WORKS	
14.3	SECTION 14.3: ELECTRIC ACUATORS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.1: ELECTRICAL & MCC**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.1		<b>MAIN POWER CABLE RETICULATION SYSTEM</b>				
		<u>Note : All items are re-measurable and only items installed or equipment required can be claimed for payment</u>				
15.1.1		<b>CABLES</b>				
		<u>Supply , installation and termination of copper PVC/SWA/PVC/ECC cables per SANS 1507.</u>				
		<u>Laid in ducts, trenches, sleeves, horizontal racks or vertical ducts.</u>				
		<u>Rates shall include the supply and fixing of supports with regard to installation of cables complete. Rates shall include PVC cable ties as required including termination.</u>				
		<u>Trenching measured elsewhere</u>				
	PS ECI 11	<b>Supply Cables PVC/SWA/PVC/ECC cables per SANS 1507</b>				
15.1.1.1		(a) 1.5mm <sup>2</sup> x 3 core ECC	m	400.0		
15.1.1.2		(b) 1.5mm <sup>2</sup> x 4 Core ECC	m	450.0		
15.1.1.3		(c) 1.5mm <sup>2</sup> x 14 core ECC	m	150.0		
15.1.1.4		(d) 2,5mm <sup>2</sup> x 4 core ECC	m	1,600.0		
15.1.1.5		(e) 6mm <sup>2</sup> x 3 core ECC	m	375.0		
15.1.1.6		(f) 10mm <sup>2</sup> x 3 core ECC	m	160.0		
15.1.1.7		(g) 16mm <sup>2</sup> x 2 core ECC	m	70.0		
15.1.1.8		(h) 25mm <sup>2</sup> x 4 core ECC	m	75.0		
15.1.1.9		(i) 35mm <sup>2</sup> x 4 core ECC	m	150.0		
15.1.1.10		(j) 150mm <sup>2</sup> x 4 core ECC	m	100.0		
15.1.1.11		k) 4mm <sup>2</sup> x BECW	m	250.00		
15.1.1.12		l) 6mm <sup>2</sup> x BECW	m	150.00		
	PS ECI 11	<b>Installation of above supplied PVC/SWA/PVC/ECC cables per SANS 1507 and SANS10142-1 in ducts , sleeves, cable tray etc</b>				
15.1.1.13		(a) 1.5mm <sup>2</sup> x 3 core ECC	m	400.0		
15.1.1.14		(b) 1.5mm <sup>2</sup> x 4 Core ECC	m	450.0		
15.1.1.15		(c) 1.5mm <sup>2</sup> x 14 core ECC	m	150.0		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.1: ELECTRICAL & MCC**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.1.1.16	PS ECI 11	(d) 2,5mm² x 4 core ECC	m	1,600.0		
15.1.1.17		(e) 6mm² x 3 core ECC	m	375.0		
15.1.1.18		(f) 10mm² x 3 core ECC	m	160.0		
15.1.1.19		(g) 16mm² x 2 core ECC	m	70.0		
15.1.1.20		(h) 25mm² x 4 core ECC	m	75.0		
15.1.1.21		(i) 35mm² x 4 core ECC	m	150.0		
15.1.1.22		(j) 150mm² x 4 core ECC	m	100.0		
15.1.1.23		k) 4mm² x BECW	m	250.00		
15.1.1.24		l) 6mm² x BECW	m	150.00		
		<b>Cable Glands : Rates shall include the termination of cables in distribution boards, MCCs , kiosks etc and equipment per supplier recommended termination detail. To include glands, shrouds, lugs and cable numbers.</b>				
15.1.1.25		(a) 1.5mm² x 3 core ECC	No	80.0		
15.1.1.26		(b) 1.5mm² x 4 Core ECC	No	90.0		
15.1.1.27		(c) 1.5mm² x 14 core ECC	No	20.00		
15.1.1.28		(d) 2,5mm² x 4 core ECC	No	90.00		
15.1.1.29		(e) 6mm² x 3 core ECC	No	24.00		
15.1.1.30		(f) 10mm² x 3 core ECC	No	8.00		
15.1.1.31		(g) 16mm² x 2 core ECC	No	4.00		
15.1.1.32		(h) 25mm² x 4 core ECC	No	4.00		
15.1.1.33		(i) 35mm² x 4 core ECC	No	8.00		
15.1.1.34		(j) 150mm² x 4 core ECC	No	4.00		
15.1.1.35	k) 4mm² x BECW	No	30.00			
15.1.1.36	l) 6mm² x BECW	No	30.00			
	<b>TRENCHING etc</b>					
15.1.1.37	SANS1200 DB, PSDB	(a) Trenching 400 wide x 550 deep in pickable to hard ground	m	120.00		
15.1.1.38		(b) Backfilling of above trenches	m	120.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.1: ELECTRICAL & MCC**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		<b>Sleeves and accessories (supply and install)</b>				
15.1.1.39		(a) Supply and install cable warning tape	m	120.00		
15.1.1.40		(b) Concrete cable markers	No.	8.00	575.00	4,600.00
15.1.1.41		(c) 110Ø uPVC cable sleeves	m	20.00		
15.1.1.42		(d) 110 Ø 90° PVC bends	No.	4.00		
15.1.1.43		(e) Coring 100 Ø holes through 200mm concrete	No.	8.00		
15.1.1.44		(f) 50 and 75 Ø uPVC cable sleeves	m	40.00		
15.1.1.45		(g) 50 and 75 Ø 90° PVC bends	No.	8.00	115.00	920.00
15.1.1.46		(h) 160 dia uPVC cable sleeves	m	50.00		
15.1.1.47		(i) 160 dia 90° PVC bends	No	8.00		
15.1.1.48		(j) Assist civil contractor with setting out and co-ordination of the construction of the sleeves , coring of openings and construction of manholes on site where required	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.2: SMALL POWER DISTRIBUTION BOARDS, MCC & ANCILLARIES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.2		<b>SMALL POWER DISTRIBUTION BOARDS, MCC &amp; ANCILLARIES</b>				
15.2.1	PS ECI 5	<b>MOTOR CONTROL PANELS</b>  <u>Design, manufacture, supply and install distribution boards, motor control panel etc. complete with doors where applicable, frames, subframes, chassis, fixtures, fittings, circuit breakers spare space, busbar etc. as per specifications and drawings/schematics where provided to SANS 1765 ( to include contractor to provide wiring diagrams and equipment list ) as specified as follows :</u>				
15.2.1.1		c) MCC 05 - Actuated Valve MCC ( Including PLC panel & HMI )	Sum	1.00		
15.2.1.2		b) MCC 04 - Sludge Pumps MCC	Sum	1.00		
15.2.1.3		c) MCC 05 - Actuated Valve MCC ( Including PLC panel & HMI )	Sum	1.00		
15.2.1.4		d) Remote Filter Control Panels 1 - 6	No	6.00		
15.2.1.5		e) Admin Building DB - A1	Sum	1.00		
15.2.1.6		f) Gatehouse DB - G1	Sum	1.00		
15.2.1.7		g) New VSDs and associated control equipment for the existing Backwash Pumps in existing MCC 01 ( replace existing star delta starters )	Sum	2.00		
15.2.1.8		h) New VSDs and associated control equipment for the new Backwash Recycle Pumps in the existing MCC 01	Sum	2.00		
15.2.1.9		i) Take free issue of the MCC 03 for the Screens & Conveyor and install in position and connect up (free issue by Screens & Conveyor contractor or supplier)	Sum	1.00		
15.2.1.10		j) UPS for MCC 02 & 05 ( 3 kVA )	Sum	2.00		
15.2.1.11	PC ECI 5 ; PC ECI 7	PLC hardware and HMI for MCC 02 & MCC0 05 as specified under the PLC Specification_Rev 06 ( specification enclosed with the tender) [ incl ethernet/serial links]	Sum	2.00		
Total Carried Forward						



**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.2: SMALL POWER DISTRIBUTION BOARDS, MCC & ANCILLARIES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.2.1.12		Batteries , UPS , battery charger etc installed in MCC cubicle as specified ( include for anti-theft limit switches on the UPS box, battery box and PLC box)	Sum	2.00		
15.2.1.13		Integrate MCC 03 , MCC 04 and the filter remote control panels to the PLC in MCC 02 & MCC 05	Sum	1.00		
15.2.1.14		Prepare and submit the hard and soft copies for approval of the FDS specification and how the PLC software will be implemented ( Provisional item)	Sum	1.00		
15.2.1.15		Allow for programming of the all PLCs using IEC-61131-3 coding standards ( Ladder Logic or other IEC-61131-3 languages are accepted) as per the PLC Specification _ Rev 06 (Provisional item)	Sum	1.00		
15.2.1.16		Allow for Thin Slice testing, FAT's, SAT's and Commissioning Stages- As per Quality Control specification. (To be conducted jointly by the EWS Engineers and staff and their representatives)	Sum	1.00		
15.2.1.17		Allow for all PLC & HMI Quality Control as per PLC Specification_ Rev 06	Sum	1.00		
15.2.1.18		Allow a sum for all the PLC licenses , including all profit and attendance	Sum	1.00		
15.2.1.19		Allow a provisional sum of R 75 000,00 for PLC OEM Training in terms of PLC programming to EWS staff members at the programmer's offices and which is clearly defined in terms of structure and method and on site training	Prov Sum	1.00	75,000.00	75,000.00
15.2.1.20		Allow for three(3) changes on the PLC and HMI software	Sum	3.00		
15.2.1.21		Allow a sum of R 350 000,00 for the modifications of the existing MCC 01 and the pumps remote control panel in the ex pump station	Sum	1.00		
15.2.1.22		Allow for profit and attendance on provisional sum above	%	350,000.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.2: SMALL POWER DISTRIBUTION BOARDS, MCC & ANCILLARIES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.2.1.23	PS ECI 23	Allow a sum to prepare wiring diagrams and component lists for comment and approval for all MCC's, electrical panels, DB's etc. supplied above.	Sum	1.00		
15.2.1.24		Allow an amount for the Engineers and Client costs to attend the FAT for all the above MCCs, control panels and DBs etc	Sum	1.00		
15.2.1.25	PS ECI 23	Allow a sum to prepare the FDS, P & ID diagrams, I/O lists and wiring diagrams, instrument loop diagrams, cable schedule and block diagrams, network and process diagrams etc complete for all MCCs & DBs, control , automation and PLC systems ,etc supplied above as specified for the entire project including all for all pump stations	Sum	1.00		
15.2.2	PS ECI 11	<b>CABLE TRAYS &amp; ACCESSORIES</b> <u>Supply and installation of heavy duty hot dipped galvanized perforated cable tray with 76mm high turn including splicers etc. The rate shall include for the fixing of cable tray against walls in a horizontal position from the soffit above by means of M8mm threaded metal rods hangers with anchor bolts at intervals not exceeding 1000mm.</u>				
15.2.2.1		a) 100mm cable trays straight	m	80.00		
15.2.2.2		b) 100mm cable tray bend and tees	No.	10.00		
15.2.2.3		c) 200 mm cable ladder	m	80.00		
15.2.2.4		d) 200mm cable ladder bends and tees	No.	10.00		
15.2.2.5		e) 300mm cable ladder	m	50.00		
15.2.2.6		f) 300mm cable ladder bends and tees	No.	5.00		
15.2.3		<b>ISOLATORS FOR ANCILLARY EQUIPMENT</b> <u>Supply, installation and connection of weatherproof isolator in IP65 slide extension box complete with box</u>				
15.2.3.1		a) 20 Amp 3 pole	No.	4.00		
15.2.3.2		b) 30 Amp 3 pole	No.	4.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.2: SMALL POWER DISTRIBUTION BOARDS, MCC & ANCILLARIES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.2.3.3		c) Weatherproof 20Amp TP rotary isolator adjacent stirrers, actuators etc	No.	40.00		
15.2.3.4		d) Emergency Stop buttons + stands corrosion proof s/steel	No.	8.00		
15.2.4		<b>Supply and install the following instrument cabling and terminations. Ethernet cabling to be CAT6E industrial grade</b>				
15.2.4.1		a) 1.5 mm <sup>2</sup> Twisted pair shielded cables - 6 Core	m	1,600.00		
15.2.4.2		b) 1.5 mm <sup>2</sup> Twisted pair cables - 6 Core Terminations	No.	80.00		
15.2.4.3		c) Modbus cabling	m	100.00		
15.2.4.4		d) Modbus terminations/ends	No.	8.00		
15.2.4.5		e) Fibre optic cabling 6 pair single mode	m	100.00		
15.2.4.6		f) Fibre optic cabling terminations/splicing	No.	8.00		
15.2.4.7		g) Cable baskets - 150mm	m	20.00		
15.2.4.8		h) Weatherproof termination boxes for WTW instruments with DIN rail, terminals etc.)	No.	30.00		
15.2.4.9		i) Weatherproof termination boxes with DIN rail, terminals and surge protection arrestors for flow meters and cabling	No	4.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.3: TELEMETRY**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.3	PS ECI 12	<b>TELEMETRY SYSTEM -WTW &amp; PUMP STATIONS</b>				
15.3.1		Disconnect , remove and deliver the existing telemetry system at the WTW to EWS stores	Sum	1.00		
		<u>Supply, install , test and commission the following to EWS standards and specifications</u>				
15.3.2		a) Telemetry panel at the WTW ( 1 site + control room )	Sum	1.00		
15.3.3		a) Telemetry panel at the remote reservoirs ( 5 sites + control room )	Sum	5.00		
15.3.4		b) Telemetry RTU , digital radios etc ( 6 sites + control room )	Sum	6.00		
15.3.5		c) Telemetry batteries - 100A/hr ( 2 per site )	No	12.00		
15.3.6		d) Webb radio antennae and associated cabling, mounting and accessories etc complete (6 sites + control room - WTW & 5 reservoirs)	Sum	6.00		
15.3.7		e) DC surge protection and optical isolation between serial devices (6 sites )	Sum	6.00		
15.3.8		f) Configuration , testing and commissioning of telemetry system and instrumentation ( 6 sites + control room )	Sum	6.00		
15.3.9		g) Integrate telemetry system to EWS SCADA system at EWS Control Room including all hardware, software and integration between all MCCs , PLCs and telemetry panel ( for WTW & Reservoirs )	Sum	1.00		
15.3.10		h) Supply wiring diagrams, compliance certificates and hand-over data pack for complete telemetry system ( for WTW and Reservoirs )	Sum	1.00		
15.3.11		i) Integrate telemetry system to EWS SCADA system at EWS Control Room including all hardware, software and integration between all MCCs , PLCs and telemetry panel ( for WTW & Reservoirs )	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.4: INSTRUMENTATION, SCADA & PLC SYSTEM**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.4		<b>INSTRUMENTATION, SCADA &amp; PLC SYSTEM</b>				
15.4.1	PS ECI 17 ; PS ECI 27	<b>INSTRUMENTATION</b>				
		<u>Instrumentation to be as per drawings, schematics, loop diagrams and to comply with EWS or industry standard specifications. Instrumentation to include all necessary sensors, transmitters, controllers and accessories to provide thorough and accurate analysis/control. All Instrumentation to be MODBUS ready unless otherwise stated. Instrumentation make &amp; model to be same or equivalent and to be approved by the Engineer prior to purchase.</u>				
15.4.1.1		a) Ultrasonic flow meter as specified - 400dia with earthing rings complete	No.	1.00		
15.4.1.2		b) Siemens or similar approved MR200 or similar and equal approved ultrasonic level transmitter ( 0-10m range ) complete with Siemens Echomax XPS0-101 R sensor , remote transmitter with mounting brackets, mounting arms amd all necessary accessories. ( linked to PLC)	No	3.00		
15.4.1.3		c) Limit switch AC/DC or similar approved	No	2.00		
15.4.1.4		d) Supply and install the IFM or similar and equal approved electronic no-flow switches with half inch sockets welded to pump delivery pipe as specified ( for raw water and other pumps )	No	5.00		
15.4.1.5		e) Supply and install low level cut-out float switches in sumps with s/s chain, weights etc as specified	No	2.00		
15.4.1.6		f) Supply and install level electrodes in sumps for control of pumps and for low level cut-out of pumps as specified	No	2.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.4: INSTRUMENTATION, SCADA & PLC SYSTEM**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.4.1.7	PS ECI 17	g) New on-site SCADA system at the WTW complete including all hardware , PC, printer , software etc complete to comply with EWS specifications and drawings. SCADA package to be fully compatible and integrate with PLC systems . SCADA & PLC to be compatible and integratable or equivalent and be approved by Engineer / Client prior to purchase. SCADA system to be Geo-SCADA as per EWS specifications	Sum	1.00		
15.4.1.8		h) Allow a provisional sum of R 175 000,00 to upgrade and re-programme the existing SCADA system in the EWS Control Room to include the WTW and all the reservoirs sites (by certified system integrator for the equipment supplied).	Prov Sum	1.00	75,000.00	75,000.00
15.4.1.9		i) Allow for profit and attendance on above item	%	75,000.000		
15.4.1.10		j) Allow an provisional amount of R 75 000,00 for the modifications of the control systems for the operation of the pumping systems	Prov Sum	1.00	65,000.00	65,000.00
15.4.1.11		k) Allow for profit and attendance on item above	%	65,000.00		
15.4.1.12		l) UPS- 6kVA for SCADA System as specified	Sum	1.00		
15.4.1.13		m) Allow a sum for a PLC/SCADA System Integrator for programming of the all the new PLCs and for the new SCADA systems at WTW Control Room	Sum	1.00		
15.4.2		<b>TRANSFORMER</b>				
15.4.2.1		a) Supply , deliver to site and off-load the new 200kVA 525/400 Volt transformer as specified	Sum	1.00		
15.4.2.2		b) Install in position and connect up the new transformer	Sum	1.00		
15.4.2.3		c) Test and commission the new transformer	Sum	1.00		
15.4.2.4		d) Disconnect , make safe and remove the existing 100kVA 525/400 Volt transformer and deliver to EWS stores	Sum	1.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.4: INSTRUMENTATION, SCADA & PLC SYSTEM**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.4.2.5		e) Provide all drawings, documentation and other details of the new transformer	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.5: LIGHTNING, SMALL POWER & SOCKET INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.5	PS ECI 8	<b>LIGHTING, SMALL POWER &amp; SOCKET INSTALLATION</b> <u>Supply and Install the following :</u>				
15.5.1		a) Flush 1 lever light switch	No.	8.00		
15.5.2		b) Surface 1 lever light switch	No.	8.00		
15.5.3		c) Flush 16A Switched socket outlet	No.	16.00		
15.5.4		d) Surface 16A Switched socket outlet	No.	6.00		
15.5.5		e) 16A Switched socket outlet industrial type surface	No.	8.00		
15.5.6		f) Weatherproof termination boxes CCG Corruguard or similar for actuated valves and instruments with terminals	Sum	8.00		
15.5.7		g) Surface 2 way light switch	No.	4.00		
15.5.8		h) 20A DP 2 pole isolators for air-conditioning units and extract fans.	No.	8.00		
15.5.9		i) 32 TP +N and earth welding socket plug surface Ampco or similar approved (cable measured elsewhere)	No.	1.00		
15.5.10		j ) 10A DP surface weatherproof rotary lockable isolators	No.	4.00		
15.5.11		k ) 10A TP surface weatherproof rotary lockable isolators	No.	4.00		
15.5.12		l) 20A TP +N and earth isolators	No.	4.00		
15.5.13		m) Photo cell wall mounted	No.	1.00		
15.5.14		n) Heavy duty waterproof motor cable termination box ( lockable ) installed adjacent the motors for easy disconnection of the cables from the motor	No.	3.00		
15.5.1		<b>PLUG &amp; LIGHT POINTS etc</b> <u>(Flush &amp; surface including conduits, bends, boxes, wiring, cabling etc. complete)</u> <u>Isolate, safely disconnect , remove and transport the following existing damaged electrics to EWS Stores</u>				
15.5.1.1		a) Light fittings ( all types )	No	12.00		
Total Carried Forward						



**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.5: LIGHTNING, SMALL POWER & SOCKET INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.5.1.2		b) Power & plug points , isolators and other power points ( all)	No	12.00		
15.5.1.3		c) Level sensors, floats , flow meters, flow switches and other instruments	No	2.00		
15.5.1.4		d) Conduits including wiring etc complete	m	80.00		
15.5.1.5		e) All cables ( for ex transformer , recycle pumps and sludge pumps etc- contractor to ascertain )	Sum	1.00		
15.5.1.6		f) Disconnect and remove the existing DB in the ex Admin Building	Sum	1.00		
		<u>Supply and install the following circuit breakers in the existing main panel or MCCs including making openings and modifying the face plate, connections, wiring etc.</u>				
15.5.1.7		a) 10 -20 Amp SP	No.	2.00		
15.5.1.8		b) 20 Amp TP	No.	2.00		
15.5.1.9		c) 80 - 100 Amp TP	No.	2.00		
		<u>Conduits , fittings , wiring, saddles , accessories etc complete for all the structures and building lighting and power points</u>				
15.5.1.10		a) 20 dia PVC conduit	m	200.00		
15.5.1.11		b) 25 dia PVC conduit	m	100.00		
15.5.1.12		c) 20 dia galvanised bosal conduit	m	80.00		
15.5.1.13		d) 25 dia galvanised conduit	m	80.00		
15.5.1.14		e) 100 x50 galvanised box with cover	No.	40.00		
15.5.1.15		f) 100 x 100 galvanised box with cover	No.	30.00		
15.5.1.16		g) 20/25 dia round boxes with cover 1-3 way	No.	40.00		
15.5.1.17		h) 1,5mm <sup>2</sup> wires	m	300.00		
15.5.1.18		i) 2,5mm <sup>2</sup> wires	m	180.00		
15.5.1.19		j) 4mm <sup>2</sup> wires	m	120.00		
15.5.1.20		k) 16mm <sup>2</sup> wires	m	120.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.5: LIGHTNING, SMALL POWER & SOCKET INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.5.1.21	PS ECI 8	l) 40 x 40 galvanised trunking with covers fixed to wall or suspended from roof or trusses	m	40.00		
		<u>Supply light fittings / luminaries and poles as specified with lamps ( refer tp project specification for details )</u>				
		All lights by TLF Lighting as follows:				
15.5.1.22		a) Type A - Surface 1,5m 2 Tube 2 x 30W LED corrosion proof diffuser	No.	16.00		
15.5.1.23		b) Type B - Surface 1,5m 2 Tube 2x30W LED panel light with VDU louvres ( office type lights )	No.	14.00		
15.5.1.24		c) Type C - Surface Bulkhead Aluminium with decorative bowl/body 1 x 18W LED	No.	12.00		
15.5.1.25		d) Type D - Floodlight with aluminium body 1 x 100W LED with reflector	No.	16.00		
15.5.1.26		e) Type E - 10m spigot with loading hinge HDG steel light pole with CB, spigot etc to accept floodlight	No.	4.00		
		<u>Install and connect the light fittings and poles supplied above.</u>				
15.5.1.27		a) Type A	No.	16.00		
15.5.1.28		b) Type B	No.	14.00		
15.5.1.29		c) Type C	No.	12.00		
15.5.1.30		d) Type D	No.	16.00		
15.5.1.31		e) Type E light pole	No.	4.00		
		<u>Cable joints for existing lights or other cables</u>				
15.5.1.32		a) 25mm <sup>2</sup> x 4C	No.	2.00		
15.5.1.33		b) 16mm <sup>2</sup> x 4C	No.	2.00		
15.5.1.34		c) Relocate the existing UPS in the existing Admin Building to the new Control Room in the new Admin Building	Sum	1.00		
15.5.2		<b>PROVISIONAL SUMS</b>				
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.5: LIGHTNING, SMALL POWER & SOCKET INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.5.2.1		Allow a provisional sum of R 150 000,00 to modify and upgrade and automate the existing control panels for the Chlorine Dosing and Chemical Dosing systems	Sum	1.00		
15.5.2.2		Allow for profit and attendance on above provisional sum	%	150,000.00		
15.5.2.3		Allow a provisional sum of R 350 000,00 to automate , integrate and connect the existing Chlorine Dosing and Chemical Dosing systems to the existing PLC and new SCADA system	Sum	1.00		
15.5.2.4		Allow for profit and attendance on above provisional sum	%	350,000.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.6: HVAC INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.6	Refer Drawings PS ECI 2.2.1.6	<b>HVAC INSTALLATION</b>  Air-conditioning and Ventilation/Extractor Fans:  Supply and install the following:				
15.6.1		a) Luft or similar and equal approved extract fans type Luft LPA 500/43F 380Volt 2m³/s with WC500 wall cowl cladding	No.	2.00		
15.6.2		b) Create opening in brickwork and side cladding , patch up, waterproof and make good	No.	2.00		
15.6.3		c) 12000Btu/hr Samsung or similar approved midwall split aircooled aircon unit ( with indoor evaporator and outdoor condensing unit ) including Bluechem treatment	No	5.00		
15.6.4		d) Refrigerant piping , control cabling and condensate drain pinpig for 12000Btu/hr units ( max 10m each ). Include for PVC trunking	No	5.00		
15.6.5		e) 24000Btu/hr Samsung or similar approved midwall split aircooled aircon unit ( with indoor evaporator and outdoor condensing unit ) including Bluechem treatment	No	2.00		
15.6.6		f) Refrigerant piping , control cabling and condensate drain pinpig for 24000Btu/hr units ( max 10m each ). Include for PVC trunking	No	2.00		
15.6.7		g) Connect all the vent fans and aircon units to their respective electrical isolators or power points	No.	9.00		
15.6.8		h) Test and commission all the aircon units supplied above	Sum	1.00		
15.6.9		i) Test and commission the all ventilation fans supplied above	Sum	1.00		
15.6.10		j) Issue the compliance certificate for all the air-conditioner and fans electrical installation supplied above	Sum	1.00		
15.6.11		k) Provide the associated documentation for all the HVAC systems supplied above ( fans and aircon units )	Sum	1.00		
Total Carried Forward						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.6: HVAC INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
15.6.12		l) Allow a sum of provisional sum of R 50 000,00 for the repairs and modifications to existing extract fans and aircon units	Sum	1.00		
15.6.13		m) Allow for profit and attendance for the above provisional sum	%	50,000.00		
15.6.14		n) Disconnect , remove and deliver the existing midwall units comprising the indoor and outdoor units complete to EWS stores	No	4.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.7: FIRE PROTECTION INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.7	SANS10400-T	<b>FIRE PROTECTION INSTALLATION</b>				
		Supply and install the following Fire Protection Equipment:				
15.7.1		a) 9 kg DCP fire extinguisher	No.	3.00		
15.7.2		b) 5 kg CO2 fire extinguisher	No.	1.00		
15.7.3		c) Photo luminescent and standard FE signs	No.	4.00		
15.7.4		d) Warning - machine starts automatically signage	No	4.00		
15.7.5		e) Warning - electricity danger and no entry signage	No	4.00		
15.7.6		f) Number plate type signage and labels for large pumps	No	6.00		
15.7.7		g) Lump sum labelling for all other equipment etc complete	Sum	1.00		
15.7.8		h) All other standard and statutory signage ,labels and notices deemed necessary	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION**

**SECTION 15.8: OTHER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.8		<b>OTHER</b>				
15.8.1		a) All other equipment and materials not measured elsewhere but necessary for complete a working installation (specify separately)	Sum	1.00		
15.8.2		b) Labelling of all switches, switchgear and equipment as specified for all 4 pump stations.	Sum	1.00		
15.8.3		c) Re-programming of PLC based on updated FDS, PID's and equipment tagging	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.9: TESTING AND COMMISSIONING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.9		<b>TESTING AND COMMISSIONING</b>				
15.9.1	PS ECI 27	<p>Test and commission the complete Electrical &amp; Instrumentation installation as specified for the WTW site all reservoirs comprising the following:</p> <p>a) Develop Site Acceptance Test (SAT) Schedule</p> <p>b) Draft submission to Engineer</p> <p>c) Revisions as required</p> <p>d) Contractor's testing (labour and special test requirements)</p> <p>e) Conduct FAT under Engineer's Supervision</p> <p>f) Conduct SATs under Engineer's Supervision</p> <p>g) Issue Final Certificate of Compliance (COC)</p>	Sum	1.00		
Total Carried Forward To Summary						



**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.10: DOCUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.10	EWS Standards	<b>DOCUMENTATION</b>				
15.10.1		a) Submit As-built Electrical & Instrumentation drawings to the Engineers satisfaction where not measured elsewhere, comprising the following for the WTW site and all reservoirs :  <u>1 x full set "red line" drawings (hard copy)</u>  <u>4 x sets manufacturers and supplier schedules and drawings (hard copy + CD)</u>	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.11: TRAINING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.11	EWS Standards	<b>TRAINING</b>				
15.11.1		Provide training to EWS personnel on systems not measured elsewhere for entire M E & I Installation as follows for the WTW site and all reservoirs :	Sum	1.00		
		a) Skills Transfer : Allow for training of 4 x EWS operations and maintenance members.				
		b) Training : Allow for Maintenance team 3 days for 4 people and Operations team 2 days for 4 people.				
15.11.2		Provide Training Manuals for entire M E & I Installation not measured elsewhere for critical operation and maintenance of the complete system for the WTW site and all reservoirs	Sum	1.00		
15.11.3		Test and issue the electrical certificate of compliance (COC) for the entire project. Separate COC's required for each building, structure or installation	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SECTION 15.12: GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
15.12	EWS Standards	<b>GENERAL</b>				
15.12.1		Provisional sum of R175 000,00 for other works as follows : (under Engineer Instruction only)  a) Site acceptance tests (SAT's) by Specialist, Client and Engineering team  b) Factory acceptance tests (FAT's) by Contractor, Client and Engineering team  <u>Profit and attendance for item above</u>  Guarantee and full maintenance of the entire M E & I Installation system for 12 months after handover to the client, comprising the following for the entire WTW site and telemetry systems for the reservoir sites :	Prov Sum	1.00	175,000.00	175,000.00
15.12.2		a) Full list of material and maintenance plan to be provided	Sum	1.00		
15.12.3		b) Material and Labour cost included  <u>Any other item the tenderer considers has been omitted and which requires pricing as separate items.</u>  i)  ii)	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
15.1	SECTION 15.1: ELECTRICAL & MCC	
15.2	SECTION 15.2: SMALL POWER DISTRIBUTION BOARDS, MCC & ANCILLARIES	
15.3	SECTION 15.3: TELEMETRY	
15.4	SECTION 15.4: INSTRUMENTATION, SCADA & PLC SYSTEM	
15.5	SECTION 15.5: LIGHTNING, SMALL POWER & SOCKET INSTALLATION	
15.6	SECTION 15.6: HVAC INSTALLATION	
15.7	SECTION 15.7: FIRE PROTECTION INSTALLATION	
15.8	SECTION 15.8: OTHER	
15.9	SECTION 15.9: TESTING AND COMMISSIONING	
15.10	SECTION 15.10: DOCUMENTATION	
15.11	SECTION 15.11: TRAINING	
15.12	SECTION 15.12: GENERAL	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 16 - LIGHTNING PROTECTION AND EARTHING INSTALLATION****SECTION 16.1: LIGHTNING PROTECTION AND EARTHING INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
16.1	PS ECI 22	<b>LIGHTNING PROTECTION AND EARTHING INSTALLATION</b>				
16.1.1		Test and carry out the earth resistivity survey and provide results and recommendations	Sum	1.0		
16.1.2		Trenching and backfilling for earth ring main or earth mat	m	160.0		
16.1.3		Trenching and backfilling for earth ring main or earth mat	m	160.0		
16.1.4		70mm <sup>2</sup> PVC insulated bonding and earth conductors	m	140.0		
16.1.5		2m long copper clad earth electrodes	No	18.0		
16.1.6		Exothermic welded connections	No	20.00		
16.1.7		70mm <sup>2</sup> terminations	No	40.00		
16.1.8		10mm dia solid aluminium roof terminal conductors saddled to concrete roof	No	55.0		
16.1.9		Allow for test points in all down conductors	No	15.0		
16.1.10		10mm dia solid aluminium roof finials at all corners of buildings	No	12.0		
16.1.11		Denso wrap to all underground connections	No	30.0		
16.1.12		Test and commission the entire lightning protection and earthing installation , provide earth test certificates ( one for each building or structure )	Sum	1.0		
16.1.13		Allow for labelling and notices for all the earthing systems	Sum	1.0		
16.1.14		Allow a provisional sum of R 40 000,00 for any un-foreseen work to be used entitle at the discretion of the Client or Engineer and for the Engineer to attend the FAT	Sum	1.0		
16.1.15		Allow for profit and attendance on the above provisional sum	%	40,000.0		
16.1.16		Provide associated documentation including all the earth test certificates, compliance certificates , as-built information and drawings and hand-over data packs	Sum	1.0		
Total Carried Forward						

**SCHEDULE 16 - LIGHTNING PROTECTION AND EARTHING INSTALLATION****SECTION 16.1: LIGHTNING PROTECTION AND EARTHING INSTALLATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
16.1.17		Any other item the tenderer considers has been omitted and which requires pricing as separate items.  i)  ii)	Sum	1.0		
Total Carried Forward To Summary						

**SCHEDULE 16 - LIGHTNING PROTECTION AND EARTHING INSTALLATION****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
16.1	SECTION 16.1: LIGHTNING PROTECTION AND EARTHING INSTALLATION	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.1: CHAMBERS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.1		<b>CHAMBERS</b>				
17.1.1		<b>RAW WATER VALVE CHAMBER</b>				
		<b>Surface Repairs</b>				
17.1.1.1		Cleaning and preparation of Concrete Roof Slab and Internal Walls (Water jetting of structure to remove all loose debris and scum)	m <sup>2</sup>	10.00		
17.1.1.2		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	6.00		
17.1.1.3		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	6.00		
17.1.1.4		Proprietary cementitious repair compound Sika 212 or similar approved (Repair systems) to spall areas identified by the Engineer	m <sup>2</sup>	5.00		
17.1.1.5		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m <sup>2</sup>	5.00		
17.1.1.6		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	5.00		
17.1.1.7		Application of flexible waterproofing paint protective layer	m <sup>2</sup>	5.00		
17.1.2		<b>MOTIVE PRV CHAMBER</b>				
		<b>Surface Repairs</b>				
17.1.2.1		Cleaning and preparation of Concrete Roof Slab and Internal Walls (Water jetting of structure to remove all loose debris and scum)	m <sup>2</sup>	5.00		
17.1.2.2		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	5.00		
17.1.2.3		Application of flexible waterproofing paint protective layer	m <sup>2</sup>	5.00		
17.1.3		<b>BELVEDERE METER CHAMBER</b>				
		<b>Surface Repairs</b>				
Total Carried Forward						



**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.1: CHAMBERS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
17.1.3.1		Cleaning and preparation of Concrete Roof Slab and Internal Walls (Water jetting of structure to remove all loose debris and scum) and removal of existing paint	m <sup>2</sup>	10.00		
17.1.3.2		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	7.00		
17.1.3.3		Application of flexible waterproofing paint protective layer (Internal and External Application)	m <sup>2</sup>	20.00		
		<b>Miscellaneous</b>				
17.1.3.4		Construct 100mm Concrete Floor Slab 25Mpa inside Meter Chamber	m <sup>3</sup>	1.00		
17.1.4		<b>METCALFE METER CHAMBER</b>				
		<b>Structural Repairs</b>				
17.1.4.1		Remove existing chamber Slab and Replace with new Precast RC Slab 2m x 2m x 150mm thick with new 1.5m x 1.5m Heavy Duty Lockable Galvanized Steel Lid	Sum	1.00		
17.1.4.2		Repair Chamber Brickwork	m <sup>2</sup>	1.00		
		<b>Surface Repairs</b>				
17.1.4.3		Cleaning and preparation of Concrete Roof Slab and Internal Walls (Water jetting of structure to remove all loose debris and scum) and removal of existing paint	m <sup>2</sup>	10.00		
17.1.4.4		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	7.00		
17.1.4.5		Application of flexible waterproofing paint protective layer (Internal and External Application)	m <sup>2</sup>	20.00		
		<b>Miscellaneous</b>				
17.1.4.6		Construct 100mm Concrete Floor Slab 25Mpa inside Meter Chamber	m <sup>3</sup>	1.00		
Total Carried Forward To Summary						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.2: CHEMICAL BUILDING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.2		<b>CHLORINE STORAGE ROOM</b>				
17.2.1		<b>REINFORCED CONCRETE ROOF SLAB</b>				
		<b>Surface Repairs</b>				
17.2.1.1		Cleaning and preparation of Concrete Roof Slab and External Brick Walls (Water jetting of structure to remove all loose debris and scum)	m <sup>2</sup>	180.00		
17.2.1.2		Proprietary cementitious repair compound Sika 212 or similar approved (Repair systems) to spall areas identified by the Engineer	m <sup>2</sup>	180.00		
17.2.1.3		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m <sup>2</sup>	180.00		
17.2.1.4		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	180.00		
17.2.1.5		Application of flexible waterproofing paint protective layer	m <sup>2</sup>	180.00		
17.2.2		<b>INTERIOR WALLS(GROUND LEVEL)</b>				
		<b>Surface Repairs</b>				
17.2.2.1		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	5.00		
17.2.2.2		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	5.00		
17.2.3		<b>INTERIOR CONCRETE ROOF CEILING(GROUND LEVEL)</b>				
		<b>Surface Repairs</b>				
17.2.3.1		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	5.00		
17.2.3.2		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	5.00		
17.2.4		<b>INTERIOR CONCRETE FLOOR SLAB(GROUND LEVEL)</b>				
		<b>Surface Repairs</b>				
Total Carried Forward						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.2: CHEMICAL BUILDING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
17.2.4.1		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	5.00		
17.2.4.2		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	5.00		
17.2.4.3		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m <sup>2</sup>	180.00		
17.2.4.4		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	180.00		
17.2.4.5		Replace existing shutter flooring with Steel galvanized graters	m <sup>2</sup>	30.00		
Total Carried Forward To Summary						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.3: CLARIFIERS 1 - 6**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.3		<b>CLARIFIERS 1 - 6</b>				
17.3.1		<b>CLARIFIERS</b> Allow for draining of raw water, surface cleaning, drying and structural repairs of the clarifiers foundation and floor slab as instructed by the engineer				
17.3.1.1		Structural Repairs	Prov Sum	1.00	100,000.00	100,000.00
		<b>Surface Repairs</b>				
17.3.1.2		Cleaning and preparation of Clarifiers External Walls (Water jetting of structure to remove all loose debris, spall and scum)	m²	400.00		
17.3.1.3		Proprietary cementitious repair compound Sika 212 or similar approved (Repair systems) to spall areas identified by the Engineer	m²	400.00		
17.3.1.4		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m²	400.00		
17.3.1.5		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m²	400.00		
		<b>Structural Repairs to RC Walls on Clarifiers</b>				
17.3.1.6		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	10.00		
17.3.1.7		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	10.00		
17.3.2		<b>CHANNEL FROM HOW TO CLARIFIER INLETS</b>				
17.3.2.1		Allow for draining of raw water, surface cleaning, drying and structural repairs of the channel foundation and floor slab as instructed by the engineer	Prov Sum	1.00	100,000.00	100,000.00
		<b>Surface Repairs</b>				
17.3.2.2		Cleaning and preparation of External Walls (Water jetting of structure to remove all loose debris, spall and scum)	m²	160.00		
Total Carried Forward						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.3: CLARIFIERS 1 - 6**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
17.3.2.3		Proprietary cementitious repair compound Sika 212 or similar approved (Repair systems) to spall areas identified by the Engineer	m <sup>2</sup>	160.00		
17.3.2.4		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m <sup>2</sup>	160.00		
17.3.2.5		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	160.00		
<b>Structural Repairs</b>						
17.3.2.6		Replace Steel Galvanized Grating and Replace with new GRP Fibre Grating (600mm wide x 1m long)	No.	60.00		
17.3.3		<b>SIDE CHANNEL FROM CLARIFIER OUTLET TO SAND FILTERS</b>				
17.3.3.1		Allow for draining of raw water, surface cleaning, drying and structural repairs of the channel foundation and floor slab as instructed by the engineer	Prov Sum	1.00	100,000.00	100,000.00
17.3.3.2		Cleaning and preparation of External Walls (Water jetting of structure to remove all loose debris, spall and scum)	m <sup>2</sup>	200.00		
17.3.3.3		Proprietary cementitious repair compound Sika 212 or similar approved (Repair systems) to spall areas identified by the Engineer	m <sup>2</sup>	200.00		
17.3.3.4		Curing of repair surfaces by coating the surface with Sika Antisol curing compounds or similar approved to repaired areas	m <sup>2</sup>	200.00		
17.3.3.5		Application of protective treatment (Sika FerroGard 903+, at an application rate of 0.5kg per square meter or similar approved)	m <sup>2</sup>	200.00		
Total Carried Forward To Summary						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS**

**SECTION 17.4: SAND FILTERS 1 - 5**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.4		<b>SAND FILTERS 1 - 6</b>				
17.4.1		<b>SAND FILTERS</b>				
17.4.1.1		Structural Repairs	Prov Sum	1.00	100,000.00	100,000.00
Total Carried Forward To Summary						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.6: ADMIN BUILDING**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.5		<b>ADMIN BUILDING</b>				
		<b>Surface Repairs</b>				
17.5.1		Crack injection with Sika epoxy resin or similar approved to (tank roof and other areas identified by the Engineer)	m	5.00		
17.5.2		Cracking Filling using SikaGrout-295 Non-Shrink grout or similar approved	m	5.00		
Total Carried Forward To Summary						

**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SECTION 17.7: OTHER**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
17.6		<b>OTHER</b>				
17.6.1		Provisional sum for the design, supply, associated ancillary works and installation of new pipework within Clarifiers, including associated supports and brackets achored to clarifier walls.	Prov Sum	1.00	250,000.00	250,000.00
17.6.2		Overheads & profit on above item	%	250,000.00		
17.6.3		Provisional sum for the design, supply, associated ancillary works and installation of brickwork within main inlet channel, including associated achorage to channel walls.	Prov Sum	1.00	10,000.00	10,000.00
17.6.4		Overheads & profit on above item	%	10,000.00		
17.6.5		Provisional sum for the design, supply, associated ancillary works and installation of an overflow from the clear water reservoir to the backwash recovery tank.	Prov Sum	1.00	75,000.00	75,000.00
17.6.6		Overheads & profit on above item	%	10,000.00		
Total Carried Forward To Summary						



**SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
17.1	SECTION 17.1: CHAMBERS	
17.2	SECTION 17.2: CHEMICAL BUILDING	
17.3	SECTION 17.3: CLARIFIERS 1 - 6	
17.4	SECTION 17.4: SAND FILTERS 1 - 5	
17.5	SECTION 17.6: ADMIN BUILDING	
17.6	SECTION 17.7: OTHER	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 18 - CHEMICAL BUILDING****SECTION 18.1: ALTERATIONS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
18.1		<p><b>ALTERATIONS</b></p> <p><b>NOTES:</b></p> <p>Items described as to be re-used or to be handed over to the Client are to be carefully dismantled where necessary and stacked on site where directed, and the Contractor will be responsible for their removal and storage until required, and shall make good all items missing, damaged or broken at his own expense</p> <p>Alterations to the fabric of existing structures will be executed in stages concurrently with the construction of the new work to ensure that the waterproofing integrity of the structures is maintained.</p> <p>Unless otherwise described, no materials from the alterations shall be re-used in any new work without the written approval of the client, with the exception of facing bricks required in filling to openings, etc., which may be re-used if free of cracks and chips and properly cleaned of all mortar</p> <p>The Contractor is to take all dimensions affecting the existing buildings on the site as he will be solely responsible for all new work being to the correct sizes. The Engineer's Representative is to be notified immediately of any discrepancies between the drawings and the existing work and all work affected by these discrepancies is to be suspended until such time as the Engineer's Representative shall authorise its continuance</p> <p>Prices are to include for carting away from site all materials not specifically mentioned as being stored on site for re-use or handed over to the client and all rubbish, debris, etc., arising from the alterations, etc., and for making good all work damaged or disturbed to the approval of the client</p>				
Total Carried Forward						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.1: ALTERATIONS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
18.1.1		<b>Tenderers are to include in pricing for the statutory requirements with regard to the demolition and disposal of asbestos cement material arising from the works</b>				
18.1.1.1		<b>GENERAL</b>				
18.1.1.1		Allow for protecting all existing work liable to suffer damage (i.e. walls, finishes, floors, windows, etc.) from damage during the building operations, alterations, etc., and make good all work damaged with new material to match existing to the approval of the client	Sum	1.0		
18.1.2		<b>REMOVAL OF EXISTING WORK</b>				
18.1.2.1		<b>Taking out and removing doors, windows, etc., from brickwork to remain (building up or altering opening elsewhere measured)</b>				
18.1.2.1		Hardwood single door and frame not exceeding 2,5m <sup>2</sup>	No.	2.0		
18.1.2.2		Glazed steel window not exceeding 2,5m <sup>2</sup>	No.	14.0		
18.1.2.3		Roller Shutter Garage Door	No.	1.00		
18.1.2.4		<b>Taking out doors, windows, etc including thresholds, sills, etc from brickwork to be demolished and stored for reuse as directed by the Engineer.</b>				
18.1.2.4		Provisional Sum for the Removal of applicable items from the building	Prov Sum	1.0	10,000.00	10,000.00
18.1.2.5		Overheads and Profit on the above	%	10,000.0		
18.1.3		<b>PREPARATORY WORK TO EXISTING SURFACES</b>				
18.1.3.1		<b>Preparatory work to existing surfaces</b>				
18.1.3.1		Remove paint and plaster surface from existing walls	m <sup>2</sup>	380.0		
Total Carried Forward To Summary						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.3: METALWORK

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
18.2	SANS 1200 H, PSHA, PACP	<b>METALWORK</b>				
18.2.1	<b>SANS 1200 H</b>	<b>STRUCTURAL STEEL</b>				
	<b>8.3.7</b>	<b>HANDRAILS</b>				
18.2.1.1		Removal of the existing handrails	m	20.0		
	<b>8.3.7 b)</b>	<b>Supply and install stainless steel handrail assembly complete with stanchions, bends and ends with chemical anchors</b>				
18.2.1.2	8.3.7 b) 1)	Horizontal (hand and knee rails)	m	20.0		
18.2.1.3	8.3.7 b) 2)	Sloping	m	10.0		
18.2.1.4	8.3.7 b) 3)	Shaped ends and bends	No.	8.0		
Total Carried Forward To Summary						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.3: PLASTERING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
18.3	PABR 5.3.1	<b>PLASTERING</b>				
18.3.1		<b>PRICES</b>  The prices of mouldings, weathering, skirting, labours, etc. shall include for forming mitres, stops, etc. unless otherwise described  The prices of all rendering shall include for working around pipes, balusters, etc  Rates for plaster are to include for all filling to and working around electrical conduits, etc., prior to plastering				
18.3.2		<b>SCREEDS</b>  Screeds steel trowelled to falls, on concrete				
18.3.2.1		1:3 cement plaster, 30mm min thick on floors and landings	m <sup>2</sup>	110.0		
18.3.3		<b>INTERNAL PLASTER</b>  One coat cement plaster on brickwork:				
18.3.3.1		Walls	m <sup>2</sup>	380.0		
Total Carried Forward To Summary						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.4: PAINTING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
18.4		<b>PAINTING</b>				
18.4.1		<b>PREPARATORY WORK TO EXISTING WORK</b>  Previously painted plastered surfaces:  Surfaces shall be thoroughly washed down and allowed to dry completely before any paint is applied. Blistered or peeling paint shall be completely removed and cracks shall be opened, filled with a suitable filler and finished smooth  Previously painted metal surfaces:  Surfaces shall be thoroughly rubbed and cleaned down. Blistered or peeling paint shall be completely removed down to bare metal  Previously painted wood surfaces:  Surfaces shall be thoroughly cleaned down. Blistered or peeling paint shall be completely removed and cracks and crevices shall be primed, filled with suitable filler and finished smooth				
18.4.2		<b>PAINTWORK ETC TO PREVIOUSLY PAINTED WORK ON FLOATED PLASTER</b>  Prepare and brush surface to remove all loose contaminants and apply and two coats interior quality acrylic emulsion paint				
18.4.2.1		On existing internal walls	m <sup>2</sup>	380.0		
18.4.3		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL FLOATED PLASTERED SURFACES</b>  One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application				
18.4.3.1		On internal Walls	m <sup>2</sup>	380.0		
18.4.4		<b>PAINTWORK, ETC. TO NEW WORK ON INTERNAL CEILING SURFACES</b>				
Total Carried Forward						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.4: PAINTING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
18.4.4.1		<b>One coat plaster primer, one undercoat and two finishing coats non drip enamel for interior application</b>  On ceiling of existing building	m <sup>2</sup>	110.00		
Total Carried Forward To Summary						

**SCHEDULE 18 - CHEMICAL BUILDING**

## SECTION 18.5: PROVISIONAL SUMS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
18.5		<b>PROVISIONAL SUMS</b>				
		Windows and Doors				
18.5.1		Replacement of all windows with aluminium windows and replacement of doors	Prov Sum	1.0	50,000.00	50,000.00
18.5.2		Overheads, charges and profit on above item 18.5.1	%	50,000.0		
		<b>Furniture</b>				
18.5.3		Supply and install furniture for workshop, storage room and associated rooms	Prov Sum	1.0	50,000.00	50,000.00
18.5.4		Overheads, charges and profit on above item 18.5.3	%	50,000.0		
		Ancillary items				
18.5.5		Supply and install ancillary items	Prov Sum	1.00	75,000.00	75,000.00
18.5.6		Overheads, charges and profit on above item 18.5.5	%	75,000.00		
Total Carried Forward To Summary						



**SCHEDULE 18 - CHEMICAL BUILDING**

## SUMMARY OF SECTIONS

SECTION	DESCRIPTION	AMOUNT (RAND)
18.1	SECTION 18.1: ALTERATIONS	
18.2	SECTION 18.2: METALWORK	
18.3	SECTION 18.3: PLASTERING	
18.4	SECTION 18.4: PAINTING	
18.5	SECTION 18.5: PROVISIONAL SUMS	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 19: COMMISSIONING & DOCUMENTATION****SECTION 19.1: COMMISSIONING & DOCUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
19.1	PSCOM	<b>COMMISSIONING &amp; DOCUMENTATION</b>				
19.1.1	PSCOM	<b>TONGAAT WTW</b>				
19.1.1.1		Commissioning of the system including the preparation and submission of a comprehensive commissioning plan covering all applicable disciplines and works.	Sum	1.00		
19.1.1.2	PSCOM 5	Appointment of a commissioning engineer (Professionally Registered) for the entire commissioning period	Sum	1.00		
		<u>Site testing, commissioning, and adjusting the plant and equipment:</u>				
19.1.1.3		All equipment including checking, starting up, pre- commissioning testing and commissioning of the Works; including reports	Sum	1.00		
19.1.2	PSCOM	<b>ELECTRICAL &amp; INSTRUMENTATION</b>				
19.1.2.1		Test the entire installation including issue of the Certificate of Compliance certificates in accordance with SANS 10142	Sum	1.00		
19.1.2.2		Commissioning of the system	Sum	1.00		
19.1.3	PSCOM	<b>MECHANICAL</b>				
19.1.3.1		Test and commission all mechanical works within the TWTW site boundary (Valves, control valves, actuated valves, dosing systems, etc)	Sum	1.00		
19.1.3.2		Commissioning of the system	Sum	1.00		
19.1.4	PSCOM	<b>PROCESS</b>				
19.1.4.1		Test and commission all equipment, process elements and ancillary elements within the TWTW site boundary	Sum	1.00		
19.1.4.2		Supply of materials, chemicals and ancillary items for commissioning purposes, the amount is to be determined by the Contractor	Sum	1.00		
19.1.5		<b>O&amp;M MANUALS, STANDARD OPERATING PROCEDURE'S AND MAINTENANCE SCHEDULES</b>				
19.1.5.1	PS SOP 10	Preparation and submission of Maintenance Schedules	Sum	1.00		
Total Carried Forward						

**SCHEDULE 19: COMMISSIONING & DOCUMENTATION****SECTION 19.1: COMMISSIONING & DOCUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
19.1.5.2	PS SOP	Preparation and submission of Standard Operating Procedures	Sum	1.00		
19.1.6		<b>FUNCTIONAL DESIGN SPECIFICATIONS</b>				
19.1.6.1		Preparation and submission of the Functional Design Specifications (FDS to be approved prior to any commissioning activities). FDS to be in accordance with EWS specifications. EWS reserve the right to workshop the FDS until the document is accepted by the various M&E, C&I & Process Departments.	Sum	1.00		
19.1.7	PS 1.3.1	<b>PIPING AND INSTRUMENTATION DIAGRAMS</b>				
19.1.7.1		Preparation of P&ID diagrams for the entire site including all associated plant & equipment. Diagrams in accordance with EWS specifications. To be provided in PDF format, Plant3D and CAD. P&ID diagrams to be provided prior to any commissioning activities.	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 19: COMMISSIONING & DOCUMENTATION****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
19.1	SECTION 19.1: COMMISSIONING & DOCUMENTATION	
Total Carried Forward To Summary Of Schedules		

**SUMMARY OF SCHEDULES**

SCHEDULE	DESCRIPTION	AMOUNT (RAND)
1	SCHEDULE 1 - PRELIMINARY AND GENERAL	
2	SCHEDULE 2 - PROVISIONAL SUMS	
3	SCHEDULE 3 - HEAD OF WORKS	
4	SCHEDULE 4 - FLOCCULATION TANKS	
5	SCHEDULE 5 - WATERWORKS EQUIPMENT	
6	SCHEDULE 6 - ADMINISTRATION BUILDING EXTENSION	
7	SCHEDULE 7 - SECURITY GUARD HOUSE	
8	SCHEDULE 8 - BACKWASH, SLUDGE AND BACKWASH RECOVERY SYSTEMS & CHAMBERS	
9	SCHEDULE 9 - CLARIFIERS	
10	SCHEDULE 10 - BACKWASH RECOVERY TANK	
11	SCHEDULE 11 - ROADS	
12	SCHEDULE 12 - STORMWATER	
13	SCHEDULE 13 - MISCELLANEOUS WORKS	
14	SCHEDULE 14 - MECHANICAL EQUIPMENT & ANCILLARY WORKS	
15	SCHEDULE 15 - ELECTRICAL & INSTRUMENTATION	
16	SCHEDULE 16 - LIGHTNING PROTECTION AND EARTHING INSTALLATION	
17	SCHEDULE 17: STRUCTURAL REPAIRS/IMPROVEMENTS	
18	SCHEDULE 18 - CHEMICAL BUILDING	
19	SCHEDULE 19 - COMMISSIONING & DOCUMENTATION	
Sub-Total		
VAT (15%)		
Total carried forward to Form of Offer		



## **PART C3: SCOPE OF WORK**

## INDEX TO PROJECT SPECIFICATIONS

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## C3.1: PROJECT DESCRIPTION AND SCOPE OF CONTRACT

### C3.1.1 DESCRIPTION OF THE WORKS

The Tongaat Water Treatment Works (TWTW) was initially constructed by Tongaat Hulett to supply potable water to the greater Tongaat area. eThekweni Municipality subsequently took over the operation & personnel of the TWTW in November 2015. To date the TWTW is currently operated and maintained by EWS. The TWTW currently supplies potable water to the greater Tongaat area via the following reservoirs:

- Belvedere Reservoir;
- Emona Reservoir;
- Hambanathi Reservoir;
- Mamba Ridge Reservoir;
- Jan Roz Reservoir (supplied from Mamba Ridge Reservoir);
- Burbreeze Reservoir (supplied from Jan Roz Reservoir);
- Tongaat South Reservoir;
- Metcalfe Reservoir;

The TWTW has an ultimate design capacity of 21Mℓ/day. The Works is currently operating at an average of 16Mℓ/day.

The eThekweni Municipality's Water and Sanitation (EWS) Unit has identified the need to undertake a functional upgrade to the Tongaat Water Treatment Works..

#### C3.1.1.1 EMPLOYERS OBJECTIVES

At present the TWTW is operating at an average of 16Mℓ/day and requires further refurbishment to the existing buildings, structures, chambers, mechanical and electrical infrastructure; as well as improvements to the unit treatment processes to restore the works to its ultimate design capacity of 21Mℓ/day.

The main project objective is to restore the TWTW to full operational capacity through multiple improvements, refurbishments and upgrades (where required) to ensure downstream reservoirs are adequately supplied with potable water.

### C3.1.2 OVERVIEW AND EXTENT OF THE WORKS

#### C3.1.2.2 MAIN COMPONENTS OF THE WORKS

The scope of works to be carried out under this Contract is shown on the drawings and described in the specifications and may be described as comprising but not limited to the following (detailed scope defined in the particular specifications and the BOQ):

##### New Head of Works

- Isolating valve
- Flow metering
- Flow rate control
- Automated screening
- A manual screen bypass that enables maintenance of the automated screen and additionally provides an emergency overflow in the event of a malfunction of the automated screen
- Backup flow measurement at V-notch weir
- Automated coagulant dosing facility with gravity flash mixing immediately upstream of the flocculation tanks
- Pre-chlorination dosing facility
- Turbidity, pH, and conductivity monitoring

**New Dual Flocculation Channels**

- Construction of new dual flocculation channels, each equipped with 4 mechanical mixers to ensure optimal mixing and flocculation

**Existing Dortmund Clarifiers (6No)**

- Refurbishment of the 6 existing Dortmund clarifiers
- Automation of sludge removal to enhance efficiency and reliability

**Existing Rapid Gravity Filters (6No)**

- Refurbishment of the 6 existing rapid gravity filters
- Automation of the backwash sequence to improve operational efficiency
- Upstream monitoring of chlorine concentration to ensure water quality

**Potable Water Reservoir**

- Incorporation of upstream post-chlorination
- Continuous monitoring of:
  - Water level
  - Turbidity
  - pH
  - Chlorine concentration

**Backwash Pumps**

- Installation of backwash pumps in a Duty: Duty: Standby configuration
- Installation of blowers in a Duty: Duty: Standby configuration

**Backwash Recovery System**

- Implementation of a system to recover and reuse backwash water

**Sludge Disposal System**

- Establishment of a system for the efficient disposal of sludge

**Metering**

- Installation of metering systems to monitor various parameters and ensure accurate data collection

**Cross Connection**

- Creation of a cross-connection between the residue disposal system and the backwash recovery system to enhance operational flexibility and efficiency

**Electrical and Instrumentation**

- Disconnection and removal of existing equipment, including actuated valves, flow meters, control panels, and transformers
- Installation of a new 200kVA 400V transformer and new MCCs for mixers, screens, conveyors, clarifiers, filters, and sludge pumps
- New control panels for automatic backwash and air blower sequencing
- Automation of chemical and chlorine dosing systems with integration to the new SCADA system
- Installation of new electrical actuators for inlet flow control, clarifier de-sludge valves, and filter backwash valves
- New ultrasonic flow meters and level sensors for various applications
- Relocation and integration of existing telemetry and PLC/HMI systems to the new control room
- Comprehensive earthing and lightning protection systems for all new structures and buildings
- New site lighting and power installations for the administration building and guard house
- Testing, commissioning, and certification of the entire electrical and instrumentation installation

**C3.1.3****TEMPORARY WORKS**

The Contractor shall carry out such temporary work, including the necessary access and construction roads, shoring of trenches and excavations etc., as he may require enabling the permanent work to be constructed. He shall allow for the cost of all temporary works, including design and their removal, in his tendered rates.

Temporary works are expected to include:

- Necessary site access and deviations for traffic where the proposed works will disrupt traffic.
- Shoring, dewatering and related temporary works required during excavation of trenches and excavations as required to enable the permanent works to be constructed. The design of the lateral support is to be undertaken by the Contractors Professional Engineer and included in the tendered rate. The design of the lateral support solution will be dependent on the technique used by the contractor to perform the excavation, as well as programmed to fit into the Contractors construction programme. The Contractor is to submit the detailed design for the approval and acceptance of the project geotechnical engineer.
- Any temporary support structures required to protect and maintain services.
- Any temporary pipe specials and fittings.
- The pipework to the clarifiers will have to be temporarily supported during the filling of the structure for the drop test. Backfilling around the structure will only take place after successful completion of the drop test.

#### **C3.1.4 LOCATION OF THE WORKS AND ACCESS**

The location of the Works and relevant access to the Works are detailed under **Part C4.1**.

#### **C3.1.5 NATURE OF GROUND AND SUBSOIL CONDITIONS**

The results of tests on ground and subsoil conditions for the Site is included in Part C4: Site Information, C4.2: Conditions on Site (Geotechnical Information). The Contractor is to ensure that variations in terms of the ground conditions are included in the tendered rates.

Trial holes may be excavated by Tenderers, (with the prior written consent of the Engineer's representative) to assist in the pricing of their excavation rates. Any trial hole shall be barricaded and shall be backfilled immediately after inspection of the soil conditions.

The tenderer shall be fully liable for any claims for losses, damage or injuries arising or as a consequence of carrying out trial hole excavations for the purpose of this tender. Furthermore, the Engineer's authority for the carrying out of any exploratory excavations is subject to the Tenderer indemnifying the Employer and the Engineer against any such claims.

## **C3.2: PROJECT SPECIFICATIONS**

### **PREAMBLE**

The Project Specifications (PS) form an integral part of the contract and supplements the Standard Specifications. They contain a general description of the works, the site and the requirements to be met.

In the event of any discrepancy between a part or parts of the Standard or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Employer's Agent before the execution of the work under the relevant clause or item.

Any reference to "the Engineer" in this document is to be read as "the Employer's Agent".

### **PS 1 ENGINEERING**

#### **PS 1.1 EMPLOYERS DESIGN**

The Employer is responsible for the overall design intent of the permanent works.

#### **PS 1.2 CONTRACTORS DESIGN**

The Contractor is responsible for the design of all temporary works, construction methods, and final mechanical, electrical, and instrumentation (MEI) designs. This responsibility includes the following:

- Design, detailing, and execution of tie-ins and interconnecting works.
- Design and implementation of shoring and lateral support systems required for trenching, as well as measures to protect the works and existing anchor block systems.
- Preparation of method statements and designs for the removal, relocation, and/or reconstruction of infrastructure and facilities on private properties, homeowners' properties, or properties owned by parastatals affected by construction activities.
- Development and approval of welding procedures, as well as certification of welders in accordance with these procedures.
- Detailed MEI designs, including but not limited to the final equipment, drawings, quality control documents, design information, layouts, schematics, and systems integration required for the permanent works.
- Investigation, design, workshopping, detailing and submission for approval of the new inlet works from the existing main Tongaat Hulett raw water pipeline, situated adjacent the boundary of the water treatment works, to the new screening structure to be constructed under this contract
- Any additional designs specified by the Employer's Agent for the Contract.
- The associated designs undertaken by the Contractor are to be signed and approved by a Professionally Registered Engineer.

The Contractor is expected to ensure all designs comply with applicable standards, regulations, and best practices, and to obtain all necessary approvals prior to implementation.

## PS 1.3 DRAWINGS

The drawings issued to Tenderers as part of the tender documents must be regarded as provisional and preliminary for the Tender's benefit to generally assess the scope of work and to develop his pricing strategy. These drawings are marked as "Tender Drawings".

The construction of the Works shall be carried out against drawing revisions marked as "for construction purposes". The Contractor has to ensure that he always refers to the latest construction drawing revision issued by the Engineer.

The Engineer shall, at commencement of the Contract, deliver to the Contractor, copies of the construction drawings in PDF format together with any associated instructions required for the commencement of the Works.

The Engineer may issue, from time to time, during the construction of the Works, revisions to previously issued drawings as may be required for adequate construction and completion of the Works. Such revisions will be in PDF format. The Contractor shall keep an updated drawing register for use on site.

The drawings are issued separately as Annexures to this document and issued as electronic documents (pdf), for tender purposes, are listed under **Part C3.5** on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link under **Part C3.5**.

The following is a list of Contract and Standard Drawings available under this Contract

### CONTRACT DRAWINGS

EWS DWG NO.	DRAWING NAME
60398/01	Project Overview
60398/2	Backwash Blower, Sludge & Backwash Recovery PW
60398/3	Backwash Gallery - Blower Pipework Details
60398/3	Backwash Gallery - Blower Pipework Details
60398/3	Backwash Gallery - Blower Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Clarifier Sludge and Blanket Pipework Details
60398/5	Backwash Recovery Pipework Details
60398/6	DN250 IV Reinforced Concrete Chamber
60398/7	DN100 Sludge & Residue IV Pre-Cast Conc Chamber
60398/8	Residue Sludge Disposal Pipework Details
60398/9	Residue Sludge Disposal Meter Chamber Det.
60398/10	Guard House
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/12	Clarifiers-SS Walkways
60398/16	Standard Details

EWS DWG NO.	DRAWING NAME
60398/17	Typical Pipe Trench Details
60398/18	GRP Access Ladder and Safety Cage Details
60398/19	Typical Security Fence Details
60398/31	General Layout Option 3 General Arrag. Live Tapping
60398/32	General Layout Option 4 General Arrag.
60398/33	General Layout Option 5 General Arrag.
60398/34	Hydraulic Profile
60398/35	Inlet Works and Mixers
60398/36	Inlet Works, Mixers, Flocculation & Channel Det
60398/37	Inlet Screens
60398/38	Offtake Chamber Details & Pipe Schedule
60398/39	Offtake Chamber Details & Pipe Schedule Live Tapping
60398/40	Clarifier Launder Details
60398/41	Amendments To Polymer Storage System
60398/42	Amendments To Chlorine Storage
60398/43	Standard Details Manhole Cover
60398/44	Standard Detail Access Ladder, Handgrip & Pipe Brackets
60398/48	P&ID Inlet To Dortmund Clarifiers
60398/51	Electrical Drawings
60398/52	Schematic Single Line Diagram

### ETHEKWINI STANDARD DRAWINGS

EWS DWG NO.	DRAWING NAME
006	Precast Spacer Ring
009	Notice Board
027	Valve marker
028	No 5B Valve cover
029	No 5B Valve Cover Orientation
45001	Dirt Box Details
45002	Thrust Block Details
45003	GRP Access Ladder
45004	Wire Mesh Security Fence & Gate
45005/ 01	GRP Access Ladder: Plan, Section & Details
45005/ 02	GRP Access Ladder & Safety Cage: Plan, Section & Details
45483	DN50 - DN150 Dirt Box Revision 4 Fabrication Details
68308	1200 x 1200 GI Manhole Cover and Frame Rev D

### PS 1.3.1

### PIPING & INSTRUMENTATION DIAGRAMS

The Contractor shall ensure that all Piping and Instrumentation Diagrams (P&ID) developed for the project conform to the specific requirements by the Employer. The Contractor shall ensure that the P&ID diagrams comply with the following:

- All symbols, notations, and representations must conform to the Employer's standard conventions.
- The P&IDs must clearly indicate all piping systems, flow direction, control systems, instrumentation (separately indicating probe elements, transducers, transmitters, field indicators etc where applicable), control and alarm set points, hard and soft linkages and interlocks, valves, and other equipment, together with all tag numbers, as per the project requirements

The P&ID diagrams must be provided in the following formats:

- CAD Format: All P&ID diagrams must be delivered in AutoCAD or an equivalent 2D CAD format to ensure compatibility with the Employer's systems.
- Plant 3D Format: The P&ID diagrams must also be submitted in Plant 3D format.
  - This format should provide a 3D representation of the piping, equipment, and instrumentation. It should allow the Employer to visualize the systems in three dimensions, facilitating integration with other 3D design models, clash detection, and further design validation. The Plant 3D files must include all relevant components, with accurate spatial relationships, dimensions, and connection points, ensuring that the system layout aligns with the physical design requirements and can be integrated with other engineering disciplines.
- The cost for the P&ID's are deemed included in the tendered rates.

#### **PS 1.4**

#### **EQUIPMENT**

##### **PS 1.4.1**

##### **GENERAL REQUIREMENTS**

The Contractor shall ensure that all equipment required for the Water Treatment Works, including process, mechanical, electrical, instrumentation, and control components, is subject to the Employer's acceptance and the Employer's Agent's approval prior to procurement and installation. The equipment planning, review, approval and delivery process must adhere to the following procedure, ensuring compliance with all project and particular specifications.

##### **PS 1.4.2**

##### **EQUIPMENT LIST DEVELOPMENT**

The Contractor shall develop and submit a comprehensive Equipment List for all equipment to be utilized on the Contract. The Equipment List shall include, but not be limited to, the following details:

- Description of each item (e.g., pumps, valves, filtration units, electrical panels, etc.).
- Manufacturer and model number.
- Technical specifications and compliance with applicable standards (e.g., SANS, ISO).
- Proposed installation location or system integration details, referenced to the project drawings.
- Quantity of each item.
- Lead times of each item for procurement.
- Unique tag numbers or identifiers, as specified in the Project and Particular Specifications. Tag numbering shall be in accordance with the Employer's specific requirements and verified by the Contractor at the commencement of the Contract.
- The Contractor shall clearly identify any additional equipment not included in the design documentation or original specifications. Each item must be defined with an explanation of its function and purpose, along with reasons for its inclusion and details on how it integrates into the existing design.
- The Equipment List shall be correlated to the project's documentation, including:
  - Equipment drawings, schematics, and system diagrams.
  - Mechanical and electrical design documents.



- Control and instrumentation specifications.
- Tagging system references.
- Functional Design Specifications and PID's.
- The Contractor shall submit the Equipment List to the Employer for acceptance and the Employer's Agent for approval within 30 days of the contract commencement.
- The Contractor shall thereafter provide an updated Equipment List every 30 days and presented at ongoing technical meeting.

#### **PS 1.4.3 SUBMISSION OF DETAILED EQUIPMENT DOCUMENTATION**

Upon approval of the Equipment List, the Contractor shall submit detailed technical documentation for each listed item. The documentation shall include:

- Manufacturer's data sheets, technical specifications, and catalogues.
- Detailed drawings for installation, assembly, and electrical integration, with references to the relevant tag number.
- Performance curves or other supporting test data.
- Installation and operation manuals, with reference to the tag number for each item.
- Warranty documentation and after-sales support details.
- For additional equipment not previously included in the design documentation, the Contractor shall submit a comprehensive description of the equipment's function, the justification for its inclusion, and its impact on the overall system performance.
- The detailed documentation shall be submitted to the Employer for acceptance and to the Employer's Agent for approval before procurement or installation can proceed.

#### **PS 1.4.4 TECHNICAL REVIEW AND APPROVAL**

The Employer's Agent shall review the submitted documentation to ensure completeness, compliance with the contract specifications, and that the equipment aligns with the Equipment List and tagging system.

The Employer's Agent shall provide written approval or rejection of the provided documentation at a timeframe agreed with the Contractor. The minimum duration for responses shall be 20 days from the date of submission and the Contractor is to ensure this is reflected in the programme.

If the submission is rejected, the Contractor shall revise and resubmit the documentation, addressing any comments or additional requirements within 10 days of rejection.

Upon receipt of approval from the Employer's Agent, the equipment will be deemed approved, subject to any final conditions.

#### **PS 1.4.5 CONFIRMATION OF EQUIPMENT AND SUPPLIER COORDINATION**

If the Employer or Employer's Agent requires further clarity on the proposed equipment, the Contractor shall arrange a meeting with the supplier to discuss the equipment's technical specifications, integration into the system, and any necessary adjustments to meet the project's requirements, this timeframe is to be factored into the Contract Programme.

- The Contractor shall facilitate and attend this meeting with the supplier, Employer, and Employer's Agent to confirm the equipment's suitability and compliance with the contract specifications.
- The meeting shall focus on resolving any questions or concerns related to the equipment's features, its role within the overall system, Employer specific technical requirements and any potential modifications.
- Following the meeting, any required changes to the equipment shall be documented and reflected in the updated submission for approval by the Employer and Employer's Agent.

- This coordination shall occur before procurement or fabrication, with approval provided by Employer's Agent.

#### **PS 1.4.6 INSPECTION AND TESTING**

The Employer reserves the right to inspect the equipment at the manufacturer's facilities/factory to ensure compliance with the approved specifications. The total cost for this is deemed included in the tendered rates.

#### **PS 1.4.7 EQUIPMENT DELIVERY AND CERTIFICATION**

Upon delivery of equipment to site the Contractor shall ensure tags are installed on all equipment referencing the approved tag numbers and ensuring compliance with the Equipment List, project and particular specifications.

#### **PS 1.4.8 NON-CONFORMANCE AND RECTIFICATION**

Any equipment procured or installed without prior acceptance and approval, shall be considered non-compliant. The Contractor shall be responsible for all costs associated with the rectification of non-compliant equipment, including removal, replacement, and any updates to the tagging system to ensure alignment with the approved documentation.

### **PS 2 PROCUREMENT**

#### **PS 2.1 SUB CONTRACTING**

##### **PS 2.1.1 SCOPE OF MANDATORY SUB-CONTRACTING**

Mandatory sub-contracting is specified under the section dealing with Contractors Participation Goal in the Tender and Contract Data.

##### **PS 2.1.2 SELECTED SUB-CONTRACTORS**

Selected sub-contractors pertain to the procurement, supply and installation of mechanical, electrical, instrumentation, process and specialised equipment.

The Employer, with the assistance of the Engineer, will prepare a detailed scope of work and or specification for the work or supply items to be executed by a Selected Sub Contractor.

The Employer and the Contractor will compile a list of firms or persons acceptable to both and who will then be invited by the Contractor to submit tenders for the required work to be carried out or goods to be supplied by Selected Sub Contractors. When the tenders are received, they will be evaluated by the Employer and the Employer will indicate which tender he requires to be accepted by the Contractor. The Contractor will be advised accordingly. The Contractor shall then accept that Tender and appoint the relevant Selected Sub Contractor.

The Contractor shall incorporate in his sub-contract provisions the following:

- 1) In respect of the work carried out or the goods supplied that are subject to the sub contract, the Selected Sub Contractor undertakes to the main Contractor mutatis mutandis the obligations and liabilities as are imposed upon the Contractor to the

Employer in terms of the Contract, and holds the Contractor harmless from and indemnifies him against the same and in respect of all claims, demands, therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities.

- 2) The Selected Sub Contractor shall also hold the Contractor harmless from and indemnify him against the following:
  - a) Shortcomings in the sub-contract work if and where the work was designed by the Selected Sub Contractor,
  - b) Defects in the goods if and where goods were manufactured and or supplied by the Selected Sub Contractor,
  - c) Any negligence by the Selected Sub Contractor or his/her agents, workmen and/or servants,
  - d) Any misuse by the Selected Sub Contractor of any constructional Plant, temporary works or materials provided by the Contractor for the purposes of the Contract,
  - e) Any claims as aforesaid.

### **PS 2.1.3 ATTENDANCE TO SUB-CONTRACTORS**

Attendance to sub-contractors is to comply with the Conditions of Contract.

### **PS 2.1.4 CATHODIC PROTECTION INSTALLATIONS**

The Cathodic Protection installations will be designed and constructed by a selected sub-contractor. The Employer will advise on his choice of selected sub-contractor.

The main contractor will be required to appoint the selected subcontractor and enter into an agreement with the selected sub-contractor.

The payment for the cathodic protection work will be effected from the provisional sum allowed for under the Preliminary and General section and the Contractor will be remunerated on an extra over for costs and profits basis as shown in the Bill of Quantities.

The CP sub-contractor will have to be health and safety compliant in terms of the relevant legislation applicable and it will be the main contractor's duty to manage this function. The rates provided by the Contractor and shown in the Bill of Quantities are deemed to be full and final payment for all the Contractor's costs, including coordination of CP work into the required construction programme, allowing for lead times on CP work execution and management of the CP contractor in terms of his sub contract.

**PS 2.2      PREFERENTIAL PROCUREMENT PROCEDURES**

For the purpose of this Contract the Contractor shall comply with the preferential procurement and CPG statement provided in F3.11 of the Tender Data. Relevant Contract Data items are applicable.

**PS 2.2.1      REQUIREMENTS**

The requirements are detailed in the Tender and Contract Data.

**PS 2.2.1      TARGETED PROCUREMENT**

The requirements are detailed in the Tender and Contract Data.

**PS 3      CONSTRUCTION**

A range of standard specifications are referred to in this document, either as listed applicable standard specifications below or as standard specifications listed in Particular specifications and amended standard specifications.

Whilst every attempt is made to refer to all the standard specifications in the lists, it could be that other standards are referred to in the Particular Specifications or amended standard specifications without being listed in the lists. Such omission from the lists, should it occur, should not be seen as misinformation and it is to be noted that ALL standards specifications referred to in this document are applicable, whether listed or not.

It is the Contractor's duty to obtain copies of referenced standard specifications at his cost and all tendered rates shall be deemed to include for these costs.

**PS 3.1      APPLICABLE SANS 1200 STANDARDS**

Refer to Part C3.3

**PS 3.2      APPLICABLE SANS SPECIFICATIONS**

Refer to Part C3.3

**PS 3.3      APPLICABLE INTERNATIONAL STANDARD SPECIFICATIONS**

Refer to Part C3.3

**PS 3.4      PARTICULAR SPECIFICATIONS**

Particular specifications are issued separately to this document and issued as electronic documents (pdf), for tender purposes, are listed under **Part C3.4** on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link under **Part C3.4**.

**PS 3.5      CERTIFICATION OF RECOGNISED BODIES**

Wherever possible, items and materials for construction of the Works shall comply with the relevant South African Bureau of Standards Specifications and with the British Standards where these are applicable in the absence of local standards.

The Contractor shall, when called upon by the Engineer, furnish the required Standard Specification compliance certificates.

## **PS 3.6 SITE ESTABLISHMENT**

### **PS 3.6.1 SERVICES PROVIDED BY THE EMPLOYER**

Space for office accommodation within the fenced site might be allowed. Contractor to establish adequacy of space within confines of space within fenced area.

The Employer shall be indemnified in all respects as a result of the occupation and use of the land and buildings, including any claims from third parties.

The allocated and occupied land and buildings is to be used only for site offices and for storage of materials and strictly for work pertaining to this contract.

The Contractor is fully responsible for any damage caused to the land and buildings, or improvements on it including services and for reinstating it to its former condition when vacated.

Should the Contractor want to occupy any portion of land not indicated by the Engineer, the required approval for same has to be obtained from the Engineer who will evaluate the request in terms of legislation and by laws applicable.

The Contractor shall ensure that the conditions of the EMP are met for all site offices and fabrication yards.

All tendered rates shall be deemed to include for all costs related to Site Offices and Fabrication Yards, regardless of their location.

The land and buildings used for the Contractor's camp shall be cleared and vacated by the Contractor within 14 days of the date of completion of the contract unless written permission from the Engineer is obtained to occupy the site for a longer period.

### **PS 3.6.2 FACILITIES TO BE PROVIDED BY THE CONTRACTOR**

The Contractor is responsible for:

- All Camps, Depots and Workshops as well as storage areas.
- The accommodation arrangements for Contractor's employees remain the responsibility of the Contractor in all respects. This includes arrangements for transport. See Conditions of Contract.
- Additional space requirements which cannot be accommodated on site as made available to the Contractor.

### **PS 3.6.3 STORAGE AND LABORATORY FACILITIES**

The Contractor is responsible for the provision of storage facilities.

Storage facilities shall be suitable to ensure storage of materials and equipment and Plant on site, ensuring adequate protection.

Plant and equipment shall be stored on suitably prepared hard surfaces with adequate shade cover.

There are no specific laboratory requirements to the contract except for the fact that laboratories need to be SANAS registered.

**PS 3.6.4 OTHER FACILITIES AND SERVICES****PS 3.6.4.1 Source Of Water Supply**

The Contractor shall make his own arrangements for water supply connections for the camp sites and work fronts and shall be required to bear the cost of all water consumed at camp sites, inclusive of the connection fees. Should reticulated water not be available at any of the work locations, the Contractor shall be responsible for sourcing and storing of potable water for consumption and hygiene and water for construction purposes.

The Contractor shall make his own arrangements for water supply connections for construction purposes. The tendered rates under the individual items in the Bill of Quantities which require water for construction purposes, shall be deemed to include all the costs of water supply.

The water quality requirements for reinforced concrete needs to be met.

Water quality requirements for pipeline and structure disinfection shall be met.

The cost of water required to charge newly constructed pipeline sections for hydrostatic testing for the first time shall be borne by the Employer. (See amended specifications - Clause PSL 7). Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

The cost of water required to fill structures for testing shall be borne by the Employer. (See amended specifications - Clause PSG). Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

The cost for all water required for the execution of the construction of the Works shall be borne by the Contractor, excluding the costs highlighted above.

The Contractor shall make his own arrangements for water supply connections for the camp sites and work fronts and shall be required to bear the cost of all water consumed at campsites, inclusive of the connection fees. Should reticulated water not be available at any of the work locations, the Contractor shall be responsible for sourcing and storing of potable water for consumption and hygiene and water for construction purposes.

**PS 3.6.4.2 Source Of Power Supply**

The Contractor shall make his own arrangements for power supply connections for all camp sites and work fronts for construction purposes and he shall bear the cost of all power consumed, including the connection fees. Should it be required, the Contractor shall allow for the costs for the power supply for construction purposes, in the preliminary and general section of the BOQ.

The supply of a new power supply for telemetry equipment, if required, is a matter of specification and catered for in the contract documents.

**PS 3.6.4.3 Source Of Sewerage Connection**

Water-borne sewerage reticulation is not available in the area.

The Contractor shall provide at his own cost the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities have to be provided. Such conveniences, which shall comply with Municipal regulations, shall be maintained in a clean and hygienic condition and shall be properly secluded from public view and their use shall be strictly enforced. On removal of such conveniences the sites thereof shall be left in a clean, sanitary and tidy condition.

## **PS 3.6.5 OFFICE SPACE/FACILITIES AND EQUIPMENT FOR EMPLOYER AND ENGINEER**

### **PS 3.6.5.1 Engineer's Office:**

An office is required for the use of the Employer's Agent on site. (See SABS 1200 AB and as amended in the project specifications).

It will be a requirement of this contract that all work pertaining to the provision of the office of the Employer's Agent shall be completed in full prior to the Contractor being permitted to commence work on site.

### **PS 3.6.5.2 Parking Facilities:**

The Contractor shall provide 4 dedicated parking areas for the Employer and the Engineer for exclusive use. Parking area to be covered with suitable covering to provide 100% shade.

### **PS 3.6.5.3 Ablution Facilities:**

A male and female ablution facility with wash hand basis shall be made available for exclusive use for the Engineer and Employer.

## **PS 3.5.6 ADVERTISING RIGHTS AND NOTICE BOARDS**

Advertising rights remain with the Employer.

A notice board for the construction activities, should be erected at the construction site. The requirements of PSAB of SABS1200 apply.

## **PS 3.7 MATERIALS SUPPLIED BY THE EMPLOYER/CONTRACTOR**

### **PS 3.7.1 PIPE SUPPLIED BY THE CONTRACTOR**

Pipe shall be supplied in terms of the Particular Specification for steel pipe as attached in the annexures and Project Specification.

The following schedule of technical requirements are applicable for steel pipes:

- The steel pipe under this contract shall be grade X42, 4.5mm thick spigot and socket pipe plain ended on the non-bell side for fillet welding at the bell when jointing.
- The size of the pipe, the grade of steel for the pipe and wall thickness is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- Pipe shall be ordered and delivered to site in lengths of no less than 12.192m.
- The internal lining system shall be Pipe Lining System 2: Cement Mortar Lined as per the steel pipe specification unless otherwise stated.
- The external coating system shall be Pipe Coating System 4: 3 layer polyethylene pipe coating system as per the steel pipe specification unless otherwise stated.

The following schedule of technical requirements are applicable for PVC-M pipes:

- The PVC-M pipe under this contract shall be spigot and socket pipe with integral socket and locked-in rubber ring seal

- Pipe shall be ordered and delivered to site in lengths of no less than 6.0m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All PVC-M pipes are to comply with SANS 966-2

The following schedule of technical requirements are applicable for HDPE pipes:

- The HDPE pipe under this contract shall be plain ended for heat fusion/ thermofusion butt welding.
- Pipe shall be ordered and delivered to site in lengths of no less than 6.0m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All HDPE pipes are to be PE100 and comply with SANS ISO 4427.

### **PS 3.7.2 PIPE YARDS AND PIPE COLLECTION**

The Contractor shall keep adequate records of his pipe upliftment activities and his pipelaying activities to ensure that he can do a pipe reconciliation of pipe material utilized. This pipe reconciliation shall be kept up to date on a weekly basis and shall form part of the permanent construction records to be incorporated into the construction dossier.

### **PS 3.7.3 VALVES**

The Contractor shall supply valves for incorporation into the Works which comply with the particular specifications for valves as attached in the annexures.

Valve technical data sheets are included in the returnable documents section. These technical data sheets have to be completed.

### **PS 3.8 CONSTRUCTION EQUIPMENT**

Construction equipment utilised for reinstatement of pipe trenches shall be suitably sized for the work at hand. Rates for backfill and compaction as entered into the BOQ, shall be deemed for full compensation of the work, regardless of whether the pipe trench backfill is listed under PSLB or the PSM series of clauses. The rates provided for backfilling and compaction of pipe trenches, whether in road reserves, in roads and road crossings or in open veld shall be deemed to have evaluated the type of plant required for the applicable work to achieve the outcomes required as stated in the specification.

### **PS 3.9 EXISTING SERVICES**

#### **PS 3.9.1 LOCATION AND PROTECTION**

SANS 1921-1 Clause 4.17 has relevance and is added to herewith.

All enquiries on the latest situation with services are to be undertaken by the Contractor. The location of the services shown on the drawing by the Employer were effective at the time of design only and may have changed. Time required to confirm the latest situation with services has to be allowed for by the Contractor in his programme for construction.



Attention is drawn to the fact that whilst the position of the existing pipework/pipelines, process piping, cabling and associated infrastructure have been indicated on the drawings have been provided as accurately as possible, this information may not be completely accurate and it will be necessary for the Contractor to communicate with the associated service providers and/or Employer and to prove, trace and expose services which the Contractor has been made aware of as a result of his interaction with service providers. The Contractor shall coordinate meetings with all relevant service providers before construction commences and take all the necessary steps to ascertain the location of existing services before commencing work on any section of the Works. The rates tendered for the location of services and proving of same as well as the updating of existing records of services, shall be deemed to include for these meetings.

The Contractor shall establish at the meetings with service providers, the lead times required to update records and he shall include for this activity in his Construction Programme.

The Contractor shall take all the necessary steps to ascertain the location of existing services before commencing any section of the Works and shall exercise the greatest care when working in the vicinity of such services. Before commencing his operations in any particular area, the Contractor shall request the latest available drawings from the relevant local Service Authorities, showing the location of their services already installed. The Contractor shall ensure that adequate time is allowed for making contact with the relevant Service Authorities in order for them to respond meaningfully. The Contractor shall compare the latest service locations obtained from the Service Authorities with the drawings provided for construction and where required, such construction drawings shall be updated. The Engineer shall be notified of any changes in service locations found on the construction drawings.

The Contractor shall take all necessary steps to protect any existing works or service whatsoever, against damage which may arise as a result of his operations on Site. The Contractor shall bear the cost of the repair of damage to any known service, the possible existence of which could reasonably have been ascertained by him beforehand.

### **PS 3.9.2 WAYLEAVES**

The Contractor shall procure the required equipment which will enable him to prove services.

The Contractor shall locate existing pipes, optic fibres cables, electric cables and/or any other services by hand excavation without the use of picks, to minimise the risk of damaging existing services. The Contractor shall be held responsible for any damage caused to existing services that can reasonably be traced and located.

Whilst the location of power, telephone and optic fibre cables, as well as pipelines and other services are indicated on the plan and longitudinal section drawings, this may not be comprehensive. It is the Contractor's responsibility to obtain the latest known information on services, at all times.

It is a requirement of this contract that the Contractor exposes and proves every known service within the advance work front ahead of any work being performed, in order to determine whether its level or location clashes with the designed grading of the pipeline or with the coordinates of the proposed road alignment. All services are to be proved in conjunction with each service provider prior to excavation. Such proving shall be timed to coincide with the requirements of the programme and the limitations on the length of work fronts as specified.

The cost of this work is to be included in the tendered rates for trench excavation or any other excavation and all tendered rates shall be deemed to include for the exposing of known services and the proving of its location. No additional payment will be considered for the exposing and proving of services as payment for this shall be deemed to be included in existing payment items as specified in the Bill of Quantities for all types of excavation. The item for excavation by hand to expose unknown and known services where instructed by the Engineer is for use by the Engineer only on an as and when required basis.

The Contractor shall be required to prove each and every service, indicating X, Y and Z coordinates. Claims for delays etc. arising from the non-compliance with this requirement will not be entertained.

In addition to the marking/pinpointing of known services, the Contractor is to screen the line of the proposed excavations by means of appropriate electronic tracing apparatus for other buried services, such as pipes or cables that may not be shown in services records. All services found in this manner shall be classified as known services and shall be proved as set out above.

Service connections to individual erven are to be located and handled in a manner acceptable to the Engineer. Located and proved services are deemed to be known services.

Should any services which are not on the existing services layout drawings be located, the Contractor shall add the new information to the services layout drawings in order for the employer to update his information. All tendered rates for trench excavations and road works shall include for the location of services and the updating of services drawings for the Employer.

The top surface of all existing thrust blocks are to be proven and sufficiently protected before any excavation near these thrust blocks takes place. Such thrust blocks shall be defined as a "service".

Work is to take place alongside existing high pressure water pipelines, Transnet pipelines conveying fuel, electricity cables, fibre optic cables and the like, and this is of regional strategic importance and must therefore remain in service at all times during the construction of this project. The consequences of rupturing these pipelines or cables are severe and apart from the financial implications, possible loss of life to those working nearby and/or extensive damage to property is a real threat. The Contractor's attention is therefore drawn to the necessity to exercise due caution during construction, particularly during excavations for the pipeline and chambers.

Where work is to be undertaken beneath power lines, the Engineer shall be informed at least 21 working days in advance of such construction being carried out, so that the necessary arrangements can be verified with the authorities. The Contractor shall ensure that he is, at all times, familiar with the conditions of his wayleave approvals and shall adhere to the restrictions for working in servitude areas at all times.

Where work is to be undertaken in the vicinity of Transnet pipelines, the Contractor shall ensure that a Transnet Representative is informed at least 14 working days in advance of such work being carried out. All the instructions issued by the Transnet Representative, related to work in the vicinity of the Transnet pipelines shall be adhered to by the Contractor at all times.

**PS 3.9.2 RELOCATION OF EXISTING SERVICES**

It is the responsibility of the Contractor to negotiate the relocation of services with the relevant service providers.

The Contractor shall ensure that he/she commences with such negotiations well in advance in order to be able to plan and programme such work into the programme for the construction of the Works without causing a delay to the construction of the Works.

The Contractor will be responsible for the payment of initial deposits and relocation costs and will only be reimbursed for such costs from the relevant Provisional Sum item in the Bill of Materials on a measurable basis, once proof of relevant payments have been received by the Employer.

The Contractor is to further note that no excavation machinery may excavate within 300 mm vertically or horizontally of existing water pipelines unless otherwise agreed by the Employer's Representative, the balance of the excavation being carried out is to be done by hand or by other means approved by the Employer's Representative.

**PS 3.9.3 WATER MAIN VALVE ACCESS**

Due to regular activity under construction work with water main valves being covered over, the Contractor shall ensure maintenance of access to all water main valves at all times. During asphalt layer work for example, after each pass by the paving machine, the valves shall be exposed and access maintained in a safe condition.

Whatever method the Contractor chooses to use for this work, the cost of raising the valve covers from existing level to ultimate level shall be paid only once, irrespective of the number of times a valve is uncovered. Spacer rings required for the height adjustment of valve covers shall be supplied by the Contractor. Before final setting in position of valve covers the Contractor shall liaise with the Employer's Agent regarding the direction in which covers shall be placed.

**PS 3.10 PERMITS AND WAYLEAVES**

The Employer will obtain the required and necessary approvals and the Contractor will be required to comply with the relevant authorities' and land owners requirements at all times.

The Contractor will be required to take cognisance of and comply with the general wayleave and 'permission to occupy' requirements of the authorities and land owners during the construction of the Works.

The Contractor will be required to confirm that he has notified property owners and authorities of his intentions to exercise his right in terms of the relevant wayleave or "permissions to occupy" in good time before commencement of the required work on the said properties.

**PS 4 MANAGEMENT OF THE WORKS****PS 4.1 APPLICABLE SANS 1921 STANDARDS**

The SANS 1921 Volumes 1, 2 and 6 - Construction and Management requirements for works standards and associated specification data are applicable.

Volume 1 – General Engineering and construction works

Volume 2 – Accommodation of traffic on public roads occupied by the Contractor ( note that it is a requirement of this Contract to apply the applicable clauses in this specification to the informal road reserves and accesses as described.

Volume 6 – HIV/AIDS awareness

The following amended specification data for SANS 1921 is shown in Part C3.3.

## **PS 4.2 STANDARD AND AMENDED SPECIFICATIONS**

Standard Specifications are listed under sections C3.3.

## **PS 4.3 PARTICULAR SPECIFICATIONS**

The following is a list of Particular Specifications available under this Contract which are issued separately as Annexures to this document and issued as electronic documents (pdf), for tender purposes, on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link under **Part C3.4**.

### **C3.4.1: eTHEKWINI WATER AND SANITATION PARTICULAR SPECIFICATIONS**

ITEM #	SPEC REF	DESCRIPTION
C3.4.1.1	PSOH	EWS OH&S: Site Specific Health and Safety Specification
C3.4.1.2	PSOH	EWS OH&S: Baseline Risk Assessment
C3.4.1.3	PEM	EWS Particular Specifications for Environmental Management
C3.4.1.4	PAA	EWS Particular Specifications for Daywork Schedule
C3.4.1.5	PCL	EWS Particular Specifications for Community Liaison Officer (CLO)
C3.4.1.6	PCL	EWS Particular Specifications for Code of Conduct
C3.4.1.7	STPIPE v13	EWS Particular Specifications for Steel Pipe
C3.4.1.8	MSS	Standard Mechanical Specifications
C3.4.1.9	GS	Standard Electrical Specifications
C3.4.1.10		EWS Network and Scada Specifications_Rev2
C3.4.1.11		EWS-Instrumentation Spec rev 4
C3.4.1.12		WS List of Preferred Equipment-05 December 2023-Rev 00
C3.4.1.13		Standard of Building Finishes

### **C3.4.2: PROJECT PARTICULAR SPECIFICATIONS**

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.1	PWW	WATERWORKS EQUIPMENT
C3.4.2.2	PSWPE	PUMPING EQUIPMENT

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.3	PSECI	ELECTRICAL, CONTROL & INSTRUMENTATION
C3.4.2.4	PSACT	ELECTRIC ACTUATORS
C3.4.2.5	PSVS	VALVES
C3.4.2.6	PSWM	METERS
C3.4.2.7	PABR	BRICKWORK
C3.4.2.8	PSCLR	COLOUR CODING
C3.4.2.9	PSSOP	STANDARD OPERATING PROCEDURES
C3.4.2.10	PSCOM	COMMISSIONING
C3.4.2.11	PSOM	OPERATIONAL AND MAINTENANCE MANUALS
C3.4.2.12	PA C	PARTICULAR SPECIFICATIONS FOR CORROSION PROTECTION OF STEEL PIPELINES (PSL3.9 SABS 1200)

## **PS 4.4 CONSTRUCTION PROGRAMME**

### **PS 4.4.1 TIME FOR COMPLETION**

The time for completion is stated in the Contract Data

### **PS 4.4.2 PRELIMINARY PROGRAMME**

The Contractor shall include in his/her tender, a preliminary programme for the construction of the works. This preliminary programme shall clearly indicate how the Contractor plans to perform the Works to completion within the time for completion as stipulated.

The Tenderer shall be deemed to have allowed in his tendered rates and in his preliminary programme for possible delays due to inclement weather as specified in the contract data.

### **PS 4.4.3 PROGRAMME FOR THE CONSTRUCTION OF THE WORKS**

The construction programme shall comply with the requirements of the Contract in all respects.

The following shall be included in the construction programme, in addition to the Contract requirements; as well as in its subsequent updates and adjustments as required by the Contract:

- 1) The programme shall be prepared utilising MS Project and revisions of the programme shall be issued to the Engineer in both hard copy format and electronic format. A PDF of the programme is to be provided for each submission.
  - a) The Contractor may utilise an alternative software package for managing the construction of the Works but the programme submitted to the Engineer for approval has to be in MS PROJECT format, the latest version available at the time of commencement of the Contract. The programme submitted to the Engineer for approval shall be seen as the construction programme and shall be used for all time referencing and time deliberations during construction.
  - b) Should the Contractor find that translation of his programme from a particular format into the MS PROJECT format loses essential programme elements

and formatting, the Contractor shall be required to repair such discrepancies in the electronic programme version submitted to the Engineer.

- 2) Each revision of the programme shall clearly indicate the programme name, revision number, date of issue and special variances.
- 3) The programme shall show ALL work items required to execute the work where such work items shall be properly grouped by main activity, and be able to be rolled up or down, depending on which detail needs to be viewed.
- 4) The programme shall comply with the following:
  - a) The programme work items shall be properly linked to show logic and a single critical path.
  - b) The programme shall show resources and such resources need to be levelled to reflect reality at all times.
    - i) Critical milestones shall be shown.
  - c) Critical milestones are to be agreed with the Engineer.
  - d) Accurate data shall be presented in so far as key dates and milestones are concerned, including projected completion and phased completion where required.
  - e) Production rates and durations are to be reasonable and practical.
  - f) Relationships between activities need to be logical.
  - g) The programme shall not reflect ownership of float.
  - h) Sub contractor's activities are to be shown and the duration for these are to be reasonable and practical.
    - i) The programme shall reflect the intricacies of the involvement of Emerging Contractors as per the CPG requirements under this Contract as detailed in the Contract and Tender Data.
  - i) No single activity shall have a duration of longer than 28 days
- 5) The correct and applicable programme calendar shall be used at all times.
- 6) Method Statements shall be prepared and be supported by the construction programme.
  - a) The Method Statements shall support the programme and vice versa.
- 7) The programme shall clearly indicate the obligations of the Engineer and the Employer.
  - a) The Contractor's attention is drawn to the 24 hour notification period specified under SANS 1921.
- 8) The Contractor shall include in his programme for the meetings with service providers as required under this contract. Attention is drawn to the requirement to have electrical poles relocated where such relocation is part of the coordination responsibilities on the Contractor.
- 9) Performance test witnessing for equipment supplied where not manufactured in the eThekweni region requires a notification period of 14 calendar days in order for the Employer to make arrangements for his presence should he/she wish to attend.
- 10) The Contractor shall schedule work such that rehabilitation can be done during a seasonally appropriate time.
- 11) Cathodic Protection installations will be done by a selected sub-contractor, approved by the Employer, as a specialist in the field of Cathodic Protection.
  - a) The Cathodic Protection installation takes place in conjunction with the installation of the Works and has to be coordinated with the planned scheduling of the Work's construction by the main Contractor.

- b) The main Contractor, appointed for the construction of the Works under this contract shall ensure that he sets up coordination meetings and discussions with the selected Cathodic Protection sub-contractor and ensure that all Cathodic Protection work is included in his programme for the construction of the Works, in such a manner that adequate timeframes are allowed for the said Cathodic Protection work.
  - c) The costs for coordination activities between the main Contractor and the Cathodic Protection, the programming of the Cathodic Protection work and the incorporation of this into the main programme shall be deemed to be covered by existing rates as reflected in the Bill of Quantities.
- 12) The Contractor shall allow in his programme for all the requirements pertaining to services, service proving and relocation, as stated in this specification.
  - 13) The Contractor shall allow in his programme for the mechanical, electrical and instrumentation work as detailed in the particular specifications. The work shall be programmed in such a manner that this work does not become critical path work items at any stage of the execution of the Contract.
  - 14) The Contractor shall pay particular attention to the requirements of submitting the electrical connection application to ESKOM or any other electricity provider timeously, ensuring that the delay in installation does not affect the completion and commissioning of the mechanical, electrical and instrumentation work.
  - 15) The coordination of the tie in into the EWS Water supply and reticulation lines need to be coordinated with the requirements of EWS operations. This work shall be well planned and programmed up front, to ensure that such work does not delay the construction of the Works in general. The planning around shutdowns shall allow for a maximum shut down duration of 12 hours.
  - 16) The Contractor shall schedule the construction of the Works in such a manner that all pipework constructed under this Contract is completed and tested and commissioned before commissioning commences.
  - 17) attention is drawn to the requirements set out in PSG 7.3.9 for water-tightness testing, and a period of not less than twenty-one (21) days shall be allowed for water-tightness testing in accordance with the specification. The backfilling around the structures shall only be done after successful completion of the water-tightness test.

The Contractor shall deploy to site, a qualified planner who will be responsible for the programme. This programmer shall have as sole responsibility, the updating and maintenance of the programme for the construction of the Works.

#### **PS 4.4.4 WORKING HOURS**

Normal working hours are considered to be between 07h00 in the morning and 17h00 in the afternoon, Monday to Friday with full cognisance to be taken of the information in the Contract Data and the description of working days.

All road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be in place after every work session or by 17h00 of every working day, whichever occurs first. No road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be removed before 07h00.

Working after normal working hours will not be allowed, unless it is approved by the Employer's Representative as work required to be executed under extra ordinary circumstances.



**PS 4.4.5 WORKING OUTSIDE NORMAL WORKING HOURS**

Normal working hours are considered to be between 07h00 in the morning and 17h00 in the afternoon, Monday to Friday with full cognisance to be taken of the information in the Tender Data and the description of working days. All road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be in place after every work session or by 17h00 of every working day, whichever occurs first. No road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be removed before 07h00.

Working after normal working hours will not be allowed, unless it is approved by the Engineer as "work required to be executed under extra ordinary circumstances. The requirements of the EMP in so far as working times need to be adhered to.

The Contractor will however be required to execute work outside normal working hours due to operation criteria of EWS. Some shutdowns will be night shutdowns and the bill of quantities allows for these shutdowns. The rate shall include all additional costs required to perform the works such as security, power, lighting, workmen overtime etc.

No work will be allowed outside of normal working hours as a result of the need of the Contractor to execute work in order to improve upon his programme, as a result of the programme slipping behind schedule.

**PS 4.4.6 PROGRESS REPORTING AND CONTROL**

The construction programme shall be updated at least once every 14 days and shall be tracked at all times. A tracked programme report shall be submitted to the Engineer 2 working days before each and every monthly site meeting

The requirements of the General Condition of Contract for programme updating remains applicable and events requiring such updating and as specified in the Conditions of Contract might require programme update frequencies shorter than 14 days. The Conditions of Contract are to be adhered to.

Delays to the critical path of the construction programme could be claimable in terms of the Contract, should the delay be as a result of an Employers Risk. Such claims for delay, which affects the programme, shall be in terms of the Contract. The Contractor may however experience Contractor's Risk events which could cause delays to the critical path of the programme. The Contractor shall, within 10 days of experiencing such a Contractor's Risk event, delaying the critical path of his current programme, report to the Engineer in writing what, in his opinion, caused the delay and which measures the Contractor intends putting in place, to mitigate risks of further delay.

**PS 4.4.7 WEATHER CONDITIONS AND RAIN DELAYS - PROGRAMME REQUIREMENTS**

The Contractor shall keep accurate and detailed records of weather conditions which shall be included in his daily diary submitted to the Engineer. Claims for extension of time due to abnormal weather which the Contractor considers to be worse than the expected normal conditions, will only be considered if fully motivated with supporting documentation. Agreement between the Engineer and the Contractor on days affected adversely by rain shall be reached on the day of such adverse effect or the first day immediately thereafter. Claims for rain delays shall not be agreed retrospectively, after the event, when the site conditions cannot be assessed applicably.



The Contractor shall note that his programme shall include for weather conditions that can be expected, based upon historical records. The number of days allowed for adverse weather conditions shall be clearly shown for each month on the construction programme (refer to Contract Data).

River/stream and wetland crossings, or any work in a stream are to be scheduled for execution during periods of least risk for flooding.

The algebraic sum for rain delays shall be applicable for the original contract duration excluding applicable EOT periods. The algebraic calculation shall commence upon receipt of instruction to commence with the works.

For the extended period of contract duration, that is for the period for which EOT had been granted in terms of applicable claims, every month shall be assessed on its merits, but Contractors have to make provision for normally expected rainfall as stipulated in the rainfall table, in their EOT claims. This means that in the extended period, claims for rainfall delay will only be entertained for excessive or abnormal rainfall, that is rainfall in excess of that stipulated in the rainfall table.

#### **PS 4.4.8**

#### **SHUT DOWNS FOR TIE INS**

Shut downs for tie-ins of pipework and the new flocculation structure and new head of works to existing live systems will be complex and require meticulous planning to avoid disruptions. The maximum duration for any shutdown shall not exceed the time stipulated by the Employer, which is 12 hours for this Contract. Additionally, there must be a minimum recovery period of 2 weeks between shutdowns to ensure adequate system recovery and prevent disruption to the Employer's water supply system. The Contractor shall provide 21 days notice prior to any shuts.

All planned shutdowns must be approved by the Office of the City Manager and coordinated with Tongaat Hulett. The Contractor must also coordinate with the EWS Bulk and Operations Team to ensure that on-site storage is maintained during the shutdown period.

The Contractor is responsible for providing all necessary documentation required by the Employer to communicate the shutdown details effectively. This includes, but is not limited to:

- Shutdown schedules and timing;
- Risk assessments and method statements.
- Mock shut with all necessary fittings and ancillaries.
- Notification to relevant stakeholders such as the Office of the City Manager, Tongaat Hulett, and the EWS Bulk and Operations Team.
- System recovery plans and procedures for maintaining on-site storage during the shutdown.

The Contractor must schedule the tie-in work well in advance, ensuring it is integrated into the construction programme to avoid delays in the overall project timeline and to prevent negative impacts on the Employer's water distribution system. Proper planning for the shutdowns is essential to minimize disruption to the Employer's operations.

#### Approval of Method Statements:

Lead times for the approval of method statements (including shop drawings and ancillary documentation) must be adhered to, ensuring sufficient time for review and approval before shutdown activities commence. It is thus important these are submitted well before the 21 days' notice period specified above as the normal approval period shall be considered within the contractor's control and not be considered for a contract delay event.

#### Duration of Shutdown:

The duration of shutdown must be strictly followed, with upfront planning and preparation. The Contractor shall conduct dry runs prior to actual shutdown work to ensure full readiness and identify any potential issues before the shutdown begins.

An item in the Bill of Quantities has been provided for the Contractor to price the various required shutdowns. The Contractor will be compensated for each shutdown based on the tendered rates unless otherwise agreed upon with the Employer's Representative. The shutdown rate must cover, but not be limited to, the following:

- All planning and coordination efforts, including workshopping of the method statement and recording change requests from the Employer's personnel or their agents.
- Dry runs.
- Risk assessments, method statements, and shop drawings.
- Other related works necessary to execute the shutdown safely and efficiently.

## **PS 4.5 WORK FRONTS**

Left blank intentionally.

## **PS 4.6 QUALITY ASSURANCE**

Quality assurance and the deployment of a system to ensure quality is the responsibility of the Contractor.

The Contractor's quality assurance plan shall culminate into a quality control plan with method statements which needs to be submitted to the Engineer for approval before commencement of the Works.

Approval of the quality control plan by the Engineer does not absolve the Contractor from his responsibilities under the plan.

### **PS 4.6.1 METHOD STATEMENTS**

The Contractor shall furnish the Employer's Representative with a method statement for all construction activities and in particular, but not limited to, shut downs, night shut downs, traffic management techniques as result of construction, method of application of tape wrap systems, method of repair of external coatings, method of repair of pipe internal lining, method of effecting compaction of fill around pipe, dealing with water, blasting, etc.

Method statements shall be submitted to the Employer's Representative with the programme for construction. Method statements shall be in sufficient detail for the Employer's Representative to determine their practicality and suitability and as a minimum shall include details of construction methods, work methods, plant and equipment particulars including details of critical standby equipment.

Method statements shall refer to Quality Control plans in order to assess suitability of same for the execution of the works in terms of the set Quality Control standards.

Method statements shall be cross referenced to the relevant Quality Control documentation and upon evaluation of the programme for construction, the method statements and quality Control documentation shall support the programme in order for the Employer's Representative to realistically evaluate the programme.

The Contractor is to provide EWS operations and the Employer's Representative a method statement and risk assessment. This is to be provided to EWS Operations with a minimum 14 day notice period.

**PS 4.7 DEALING WITH WATER**

Notwithstanding the requirements of SANS 1921, the Contractor shall take adequate precautions for the protection of the works from storm water runoff during periods of prolonged heavy rainfall. The Contractor shall be responsible for dealing with all water during construction from whatever source, and the cost of all dewatering, shall be deemed to be included in the tendered rates. The Contractor shall provide temporary storm water drainage and due cognisance must be taken of the highly erodible nature of the in situ and excavated material.

The Contractor shall be responsible for all repair works necessary to reinstate any damage caused by storm water runoff.

The Contractor shall be responsible for drawing up a Storm Water Management Plan for the handling of storm water for the duration of construction at the local site where the works is being constructed and all other work fronts, if applicable. The tendered rates provided in the BOQ shall be deemed to include for all Storm Water Management issues related to the Contract at all work fronts.

The Storm Water Management Plan shall conform to the requirements of the Environmental Management Plan.

**PS 4.8 DISPOSAL OF SPOIL AND SURPLUS MATERIAL**

Disposal of spoil and surplus material needs to conform with the requirements of the Environmental Specification and Employer's requirements.

The spoiling of excess bulk excavated material under this contract is the responsibility of the Contractor and he is responsible for identifying compliant spoil sites for the purpose of spoiling material. No overhaul is applicable to the Contract and all tendered rates are deemed to include for spoiling as required under the Contract.

**PS 4.9 TESTING COMPLETION, COMMISSIONING AND CORRECTION OF DEFECTS**

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Employer's Representative.

The Contractor may establish his own laboratory on site, or he may employ the services of an independent registered commercial laboratory. The costs for tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing.

The Contractor shall submit the results of tests carried out on materials and workmanship, to the Engineer, in terms of the agreed quality control plan.

The tests required by the specifications which are to be carried out by the Employer's Representative will be conducted as expeditiously as possible, and the Employer shall not be liable for damages caused by any delays resulting from such tests. Such required testing shall be incorporated into the Contractor's programme for the construction of the Works.

In addition, the Contractor shall supply to the Employer's Representative, free of charge, quantities of all materials which are truly representative of the materials to be used in the works for testing. Each sample shall be labelled, stating the sources of supply and the purpose for which it will be used. The Employer's Representative may, from time to time, instruct the Contractor to supply a further sample or samples to ensure that the quality of materials supplied conforms with the requirements of the Contract.

**PS 4.9.1 LENGTH OF PIPELINES TO BE PRESSURE TESTED**

The testing regime for the pipelines constructed under this contract is detailed under the amended specifications, section PSL. Pipelines shall be completed and tested and commissioned before filling of structures for testing commences.

**PS 4.9.2 WATERTIGHT STRUCTURE TESTING**

The testing regime for watertight structures constructed/refurbished under this contract is detailed under the amended specifications, section PSG.

**PS 4.9.3 COMMISSIONING**

Requirements for the Commissioning of the Works is detailed in the particular specifications.

The Employer shall not take beneficial occupation before commissioning as per the requirements of this specification has not been completed and the pipeline sections constructed under the Contract have not been tested and accepted in all respects.

**PS 4.9.4 PRACTICAL COMPLETION AND COMPLETION REQUIREMENTS**

The Contract requires that contractual requirements for Practical Completion and Completion as milestones to be achieved in the construction process, be defined. The following minimum requirements are to be met for these certifications:

**PS 4.9.4.1 Practical Completion**

- 1) All operations and maintenance manuals for the installed infrastructure needs to be completed and handed to the Employer for operational and maintenance purposes.
  - a) The commissioning procedures as stated in the particular specifications have to be completed.
- 2) The Water Treatment Works as a whole has to be tested and certified as safe and acceptable and be able to accept water through inlet systems, treat water and supply potable water to various reservoirs as designed, under automatic control conditions.
  - a) By default inlet control and outlet control systems have to be able to run in auto mode after hot commissioning.
- 3) All associated pipelines, scour, pumping and air valve systems and isolating valve systems have to be tested and certified correct and acceptable, with chambers being secured in terms of the design and construction requirements, fully functional.
- 4) All cathodic protection systems have to be installed and tested and functioning as required.
- 5) All mechanical systems have to be installed and tested and functioning as required.
- 6) All electrical & instrumentation systems have to be installed and tested and functioning as required.
- 7) Access roads shall be completed in all respects.
- 8) Stormwater systems shall be completed in all respects.
- 9) All as built drawings shall have been submitted.

- 10) All training to the Employers Personnel shall be completed to the satisfaction of the Employer.
- 11) All safety signage shall be in place and the entire works shall be safe for operation by the trained staff.

In terms of the Contract Data, the above will be tabled at the Contract kick off meeting and will be minuted.

#### **PS 4.9.4.1 Completion**

All the work specified under this Contract should be completed in terms of the requirements of the Contract before Completion will be certified.

#### **PS 4.10 REQUIREMENTS TO ACCOMMODATE TRAFFIC**

Traffic accommodation is required for access of heavy vehicles. The Contractor shall ensure that the requirements of an applicable traffic management plan are met.

#### **PS 4.11 SURVEY CONTROL AND SETTING OUT OF THE WORKS**

Survey control and setting out of the Works is covered under SANS 1921.

The Contractor shall be responsible for all survey work required to set out the works.

All survey data shall be signed off by a registered professional surveyor and tendered rates in the Bill of Quantities shall be deemed to include for all the costs associated with surveying for the construction of the Works. Registration required is with a recognised national body that controls the registration of professional surveyors in the Republic of South Africa.

##### **PS 4.11.1 SURVEY BEACONS AND CONTROL POINTS**

Survey control points will be shown to the Contractor at the time of handover of the site. Once survey control points have been pointed out, these will be signed over to the Contractor and such survey control points become the responsibility of the Contractor to maintain and protect and re-establish should it be damaged.

The Contractor shall take special precautions to protect all permanent survey beacons, survey pegs and control points, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any survey control points are disturbed by the Contractor or his employees, the Contractor shall have these replaced by a registered land surveyor at his own cost.

##### **PS 4.11.2 INITIAL SURVEY**

An initial survey of the terrain where construction activities are to take place, shall be executed in a 1.0m by 1.0m grid. This data will inter alia be utilised to calculate quantities from, as are applicable. The survey data so obtained shall form part of the records to be compiled into the Construction Dossier.

##### **PS 4.11.3 FINAL SURVEY**

A final survey of the terrain where construction activities did take place, shall at least cover a 1.0m by 1.0m grid, picking up all the constructed assets. The survey data so obtained

shall form part of the records to be compiled into the Construction Dossier which will be deemed to be the permanent record for construction activities.

#### **PS 4.11.4 PHOTOGRAPHIC RECORD**

The Contractor shall prepare and submit a well indexed photographic record of the progress with the construction of the Works. The photo record shall be done in intervals of at least 7 calendar days over the full duration for the construction of the Works. The photographic record shall include for drone imagery as directed by the Engineer.

The format of the indexed photographic system shall be agreed with the Engineer at the commencement of the Contract.

A provisional sum has been provided in the Schedule of Quantities to cover the cost of progress photographs and enlargements as directed by the Engineer. The Contractor shall provide good quality colour photographs as directed by the Engineer. The Contractor will be required to pay the supplier directly for these items and will be reimbursed by the Employer on submission of the original invoices to the Engineer.

#### **PS 4.11.5 AS BUILT RECORDS AND RECORDS DRAWINGS**

Any information in the possession of the Contractor which is necessary for the completion of the “as built” drawings must be submitted and approved by the Employer’s Representative before he will issue a Completion Certificate.

The Contractor is responsible for as-built point data capturing and redlining the pipework drawings for each installation and the Contractor shall:

- 1) mark-up, in RED, all the conflicting information on drawings as far as non-conformance with specifications is concerned, probable different site conditions encountered compared to what has been anticipated, differences in services locations encountered compared to what is indicated on the drawings and/or approved changes in design as instructed by the Engineer.
- 2) Any construction and or installation detail differing from that on the provided drawings shall be marked up.
- 3) The marking up of the Engineer’s drawings shall be on one of the A0 drawings issued in hard copy and shall reference any relevant site queries and sketches. Upon completion of the works, the updated information must be forwarded to the Engineer for incorporation into the Construction Dossier for which a full set of final Record Drawings will be prepared.
- 4) The drawings which the Contractor updates and which are marked up in RED shall be clearly marked in RED, in the top left hand corner, to reflect the words “RECORD DRAWING”. Should any specific drawing not require any amendments, it will be marked in RED in the top left hand corner to reflect the words “RECORD DRAWING – NO AMENDMENTS”. The Contractor shall therefore submit to the Engineer, a full set of record drawings in A0 format, marked up in RED.
- 5) All marked up in red drawings shall be submitted as a prerequisite for Completion certification.

**The Contractor may only backfill on instruction by the Employer’s Representative and shall not backfill before the As-Built point data is captured.**

The Contractor shall submit each “As Built” data point to the Employer’s Representative which shall be suitably coded and identifiable and be supplied on a computer disk in an ascii file or .csv file in tabulated format with the following column headings:-

- Code

- X Co-ordinate
- Y Co-ordinate
- Level (msl)
- Description

The above information is to be given to an accuracy of three decimal places and is to be surveyed by a suitably qualified person. It is imperative that the surveyor utilises the nearest survey control point and notifies us thereof. The survey shall be undertaken in WGS84 LO31 projection.

#### **PS 4.11.6 AS BUILT POINT ACCURACY**

Survey of pipelines, bends, specials and fittings to accuracy of less than 100mm by a Professional Register Surveyor.

The Contractor will be required to prove the accuracy of the GPS device he intends on using prior to any as built data being captured. The Employer's Representative may request further accuracy tests during the Contract should he deem it necessary.

Suitable checks on the accuracy of the information provided may be carried out by the Employer's Representative and should any of the information provided be found to be inaccurate or untrue, the Employer's Representative reserves the right on behalf of the Employer to withhold payment or to employ the services of an engineering surveyor to re-survey all the works listed above, at the Contractor's expense.

The Employer shall request a minimum of three quotations from three independent engineering surveyors of his choice, and the lowest quotation will be appointed and the cost thereof will be deducted from monies owing to the Contractor.



**PS 4.11.7 AS-BUILT DATA TO BE CAPTURED**

Item	Description	Co-Ordinates and Levels for the following
Pipelines/ Process Pipework	Positions and levels of buried and above ground pipes, valves, specials and fittings installed.	<ul style="list-style-type: none"> <li>Centre of crown of pipes, bends, tee's, reducing tee's and reducers;</li> <li>All flanges;</li> <li>All welds;</li> <li>Stem of buried isolation valves;</li> <li>Centre of Water Meters and PRVs;</li> <li>Pipelines to be surveyed every 6m and/or every change in direction</li> <li>Crown of all pipe jacks/ horizontal directional drilling sleeves</li> </ul>
Cabling		<ul style="list-style-type: none"> <li>Cable routes and associated details</li> </ul>
Chambers	Position of all Chambers	<ul style="list-style-type: none"> <li>All corners</li> <li>Location of pipe entry and exit from chamber from centre of crown of pipe</li> <li>Floor Level</li> </ul>
Structures	Position of Structure	<ul style="list-style-type: none"> <li>All corners of floor</li> <li>All corners of roof</li> </ul>
Equipment	Position of equipment	<ul style="list-style-type: none"> <li>All positions of equipment on site</li> </ul>

The Contractor shall show that all infrastructure is located within the servitude boundaries.

For other infrastructure, the Contractor shall ensure that all infrastructure constructed under the Contract is shown on the as built survey.

**PS 4.12 MANAGEMENT OF THE ENVIRONMENT**

The requirements of the Environmental Management Specifications and where applicable, Environmental Management Programme and the Rehabilitation Specification, shall apply.

The Contractor shall for the construction of the Works, confine his operation to an area as small as possible. No disturbance of vegetation shall commence without approval of the Engineer. The planning for such disturbance shall be captured in the quality control plan for the construction of the Works.

The Contractor shall comply with the statutory and local fire regulations. He shall take all necessary precautions to prevent any fires. In the event of a fire the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

**PS 4.13 SECURITY**

The Contractor is responsible for all security measures required on site and at work fronts of the linear development component of the construction of the Works.

All costs required for security measures taken on site shall be deemed to be covered in the billed rates of the Bill of Quantities.

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the



Employees of his subcontractors are able to identify themselves as members of the construction team.

An item has been included in the Schedule of Quantities for the provision of security.

#### **PS 4.14 SITE PERSONNEL**

It shall be noted that the Contractor will be required to strictly observe his obligations regarding adequate full time superintendence of the works, with particular reference to accuracy of setting out, excavations, correct steel fixing, properly constructed formwork, positioning of foundation bolts and /or bolt pockets, placing of concrete, etc in order to achieve the high standard of workmanship required of him.

It shall be a requirement of this contract that **a Site Agent, Civil/Structural Foremen, Mechanical Superintendent, Electrical Superintendent** are assigned to this contract on a full-time basis and are permanently on site. The Contractor is to also ensure that a suitably qualified Contracts Manager is appointed for the duration of this Contract.

The Contractor is to ensure that the Mechanical Lead Engineer, Electrical Lead Engineer and Instrumentation Lead Engineer are available for technical meetings, commissioning activities, Employer requests and associated works during the duration of the Contract.

The Site Agent may not leave the works whilst work is in progress without the Engineer's written approval.

#### **PS 4.15 MANAGEMENT MEETINGS**

The Contractor and Sub-Contractors shall attend regular site meetings as and when these are required by the Employer. The objectives of such meetings will be to review progress and ensure compliance with the programme, discuss, and where possible solve any problems that may arise and generally liaise with all parties concerned with the works.

The cost of attending such meetings shall be included in the tendered price and instructions given by the Employer's Representative at such meetings and confirmed in the notes of the meeting shall be considered as a written instruction by the Engineer, as referred to in the Contract.

Site Meetings will generally be held once a month but special meetings may be convened as and when required.

#### **PS 4.16 DAILY RECORDS**

The Contractor shall keep a daily site diary in which at least but not limited to the following data will be reflected:

- 1) Work executed
- 2) Plant and machinery deployed on site
- 3) Rainfall recorded
- 4) Agreement to rain delays
- 5) Disruptions and frustrations recorded for the day

The daily diary shall be submitted to the Engineer on a daily basis. The previous day diary shall be with the Engineer by 10h00 on the following working day.

Daily diaries shall be in the format as agreed with the Engineer.

Daily diaries need to be signed by the Contractor's Representative and the Engineer.

**PS 4.17      FORMAT OF COMMUNICATIONS**

Formal communication under this Contract shall comprise the issue and receipt of the following:

- 1) Official correspondence issued under transmittal slip, which includes claim and dispute documentation as required by the contractual processes
- 2) Issue of Site Instructions by the Engineer
- 3) Variation Orders issued by the Engineer
- 4) Requests for information submitted by the Contractor to the Engineer, in writing in a pre determined format
- 5) Notes on meeting proceedings, signed off by attending organisations' representatives

NOTE: random e mail correspondence generated and distributed does not constitute official correspondence and communication under this Contract.

**PS 4.18      PAYMENT CERTIFICATES**

Measurement for payment purposes will take place between the 20<sup>th</sup> and 25<sup>th</sup> of each month. The Contractor needs to submit his monthly payment claim to the Engineer by the 26<sup>th</sup> of each month. The Engineer and the Employer's Representative will review the Certificate for accuracy and completeness.

Should any of these noted dates fall on a non working day or a special non working day, the following working day shall be applicable.

**PS 4.19      EMPLOYMENT OF LOCAL LABOUR AND JOB CREATION**

Employment of local labour is detailed in the Contract and Tender Data.

**PS 4.19.1      LOCAL LABOUR STATISTICS**

The Contractor shall provide, on a monthly basis, together with his payment claim, the statistics of all labour employed under the Contract where such statistics shall as a minimum, show for each employee, the name, ID number, address, age, gender, disability level if applicable. A certified copy of the employee's ID book cover page is required as well.

The FTE statistics for the Contract needs to be submitted on a monthly basis.

This is required to comply with relevant EPWP requirements

**PS 4.20      TRAINING****PS 4.20.1      EXPERIENTIAL TRAINING – STUDENTS FROM BUILT ENVIRONMENT**

It is required to employ at least two students from the built environment under a training programme for the duration of the Contract. A stipend as allowed for in the BOQ by the Contractor under the preliminary and general section, is to be paid to the students.

**PS 4.21 HEALTH AND SAFETY****PS 4.21.1 EMPLOYERS HEALTH AND SAFETY PLAN**

The Employer's Health and Safety Specification is included in Part C3.4: Particular Specifications.

**PS 4.21.2 CONTRACTORS HEALTH AND SAFETY PLAN**

The Contractor's Health and Safety plan shall comply with the requirements of the legislation applicable.

The Contractor, shall, immediately after appointment for the construction of the Works, make contact with the Employer's appointed Health and Safety agent and familiarise himself with the requirements of the Health and Safety plan for the construction of the Works.

The appointed Health and Safety Representative for the Employer will be introduced at the hand over meeting for the Contract.

**PS 4.21.3 COST OF COMPLIANCE WITH THE RELEVANT STATUTORY REQUIREMENTS**

An item has been inserted in the preliminary and general section of the Bill of Quantities for costs pertaining to compliance with the statutory requirements pertaining to Health and Safety. Rates provided under this contract are deemed to cover all costs applicable to Health and Safety compliance.

**PS 4.21.4 BARRICADING AND LIGHTING**

Barricading and lighting is covered under the amended specification section PSD and SANS 1921.

**PS 4.21.5 TRAFFIC CONTROL**

See SANS 1921 and the traffic control management plan as included under the particular specifications.

**PS 4.21.6 AIDS AWARENESS**

Refer to SANS 1921 – Vol 6.

**PS 4.21.7 OPERATIONAL HEALTH AND SAFETY**

A provisional sum has been provided in the Schedule of Quantities to cover the cost of Operational Health and Safety (OH&S) monitoring as directed by the Employers Representative. The Contractor shall remunerate an external Operational Health and Safety Officer appointed by the Engineer for the following:

- 1) Monthly OH&S audits, report preparation & submission;
- 2) Conducting OH&S Inspections and attend progress meeting;
- 3) Conducting a close - out inspection, issuing of snag list, verify snags closed - out for works completion and the submission & preparation of a close - out report;
- 4) Disbursements;

Any additional works required by the Employers Representative.

**PS 4.21.7.1 Working under or in close proximity of overhead powerlines**

All relevant Health and Safety procedures and precautionary measures pertaining to working in the Eskom servitude or under or in close proximity of overhead powerlines shall be implemented.

The services of a cathodic protection specialist shall be obtained in order to develop the relevant procedures to be incorporated into the health and safety plan.

No additional payment for these requirements will be made and the rates provided for the laying of the pipelines shall be deemed to include for all the relevant eventualities in this regard.

**PS 4.22 ACCESSIBILITY TO SITE**

It is the Contractors responsibility to ensure access to site for all applicable plant and machinery. The Contractor shall be responsible for liaison with the applicable land owners to confirm access to site. The Contractor shall also ensure that the existing access roads are maintained and where necessary (post Employer and landowner approval) regrade, resurface or widen the existing access road to the site. The Contractor shall ensure that all applicable environmental requirements/regulations are adhered to, as well as applicable wayleaves.

**PS 4.23 PUBLIC RELATIONS OFFICER (ISD CONSULTANT )**

The Contractor shall have a full time Institutional and Social Development (ISD) Consultant to deal with all public relations that concern themselves with all aspects of Public Relations and Communication as set out in this Specification. The issues to be addressed by the Contractor shall include, but is not limited to:

- 1) Attend public meetings as and when required.
- 2) Liaise with the public on construction progress. (Ability to communicate in Zulu and English)
- 3) Set out to interact with the public on a one on one basis when required and liaise with the public on construction progress this also includes arranging of public 5.8
- 4)
- 5) Act as the CLO throughout the project across all wards.
- 6) Facilitate emerging contractors.
- 7) Labour procurement and labour desk related activities facilitate discussions between the Contractor and community through available structures; Support to labour desk officer.
- 8) Ensure that communities play their role during construction, which includes inter alia, protecting the works for the appointed contractor to implement the project within the stipulated timeframes.
- 9) Assist the appointed contractor's supervisory staff in the management of workers. Resolving disputes between the appointed Contractor, workers and community.

The ISD will be reimbursed from a Provisional Sum Item under Section 1: Preliminary and General.

**PS 4.24      ADDITIONAL SPECIALISED ENGINEERING SERVICES**

A provisional sum has been provided in the Schedule of Quantities to cover the cost of any additional specialised engineering as appointed by the Engineer

**PS 4.25      PROCEDURE FOR METER INSTALLATION AND REGISTRATION**

The Contractor will be responsible for the following procedure for installation of ultrasonic meters:

- 1) Inform Bulk Metering Technician for EWS of intention to install a meter. The following information must be provided in writing to bulk metering Technician:
  - a) Meter number
  - b) Meter size
  - c) Meter type
  - d) Property Key where meter is installed
  - e) Physical address where meter is installed
- 2) The Bulk Meter Technician will ensure that the above data is captured and will provide a "Connection Number"
- 3) Bulk Metering Technician or a representative is to be present at the commissioning of the meter, where an opening meter reading will be taken and returned for capturing to the billing system.
- 4) Technician (or representative) signs over acceptance of the meter and a "Connection Number" is provided for the meter and stencilled onto the chamber or kiosk.
- 5) For record drawing purposes, a GPS shape file is to be provided of all the installed meters with the above information included.

### **C3.3:        STANDARD SPECIFICATIONS**

This section deals with the applicable standard specifications and amendments thereto for project specific applicability.

The standard specifications are listed as a guideline and omission of any specification if applicable, does not mean the specification requirements are excluded.

The Construction of the Works shall comply with relevant and applicable standard specifications in all respects.

### C3.3.1: STANDARD SABS PROJECT SPECIFICATIONS – SANS 1200

The standard technical specifications on which this contract is based are the South African Bureau of Standards Standardized Specifications for Civil Engineering Construction SABS 1200.

Although not bound in, nor issued with this document, the following sections of the Standardised Specifications of SABS 1200 shall form part of this Contract. The standard SABS 1200 specifications are amended under **Part C3.3.4** as required.

Specification	Series	Year	Title
SABS 1200	A	1986	General
SABS 1200	AB	1986	Engineer's Office
SABS 1200	C	1980	Site clearance
SABS 1200	D	1988	Earthworks
SABS 1200	DB	1989	Earthworks (pipe trenches)
SABS 1200	DK	1996	Gabions and Pitching
SABS 1200	DM	1981	Earthworks (Roads, Sub grade)
SABS 1200	G	1982	Structural Concrete
SABS 1200	HA	1990	Structural Steelwork (Sundry Items) including GRP
SABS 1200	L	1983	Medium pressure pipeline
SABS 1200	LB	1983	Bedding (pipes)
SABS 1200	LC	1981	Cable Ducts
SABS 1200	LD	1982	Sewers
SABS 1200	LG	1983	Pipe Jacking
SABS 1200	LE	1982	Stormwater Drainage
SABS 1200	M	1996	Roads General
SABS 1200	ME	1981	Sub-base
SABS 1200	MF	1981	Base
SABS 1200	MH	1981	Asphalt base and surfacing
SABS 1200	MK	1983	Kerbing and channeling
SABS 1200	MM	1984	Ancillary Works

### C3.3.2 APPLICABLE SANS SPECIFICATIONS

The following SANS specifications are referred to in this document or are applicable to the Contract and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria.

Specification	Year	Title	Applicable to:
SANS 28	2010	Metal ties for cavity walls	PA_Brickwork
SANS 62 - 1	2013	Steel Pipes Part 1 – Pipes suitable for threading and of nominal size not exceeding 150mm	PSL
SANS 62 - 2	2009	Steel Pipes Part 2 – Screwed pieces and pipe fittings of nominal size not exceeding 150mm	PSL
SANS 0100 - 2	2014	The Structural use of Concrete - Materials and execution of work	PSG
SANS 0102 - 1	2013	The selection of pipes for buried pipelines - General Provisions	PSLB
SANS 120	2009	Stemming for use in blasting	PSD
SANS 121	2011	Hot dip galvanised coatings on fabricated iron steel articles – Specification and Test Methods	PSL

Specification	Year	Title	Applicable to:
SANS 135	2011	Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium	PSL
SANS 136	2008	Metallic Coatings – Electrode deposited coatings of nickel	PSL
SANS 227	2007	Burnt Clay Masonry Units	PA_Brickwork
SANS 307		Bituminous binders for road construction and maintenance	PSMH
SANS 309	2004	Anionic bitumen road emulsions	PSMH
SANS 509	2007	Pallet trucks - Principal Dimensions	PSG
SANS 548	2003	Cationic bitumen road emulsions	PSMH
SANS 657	2011	Steel tubes for o-pressure purposes Part 1: Sections for scaffolding, general engineering and structural applications	PSMM
SANS 664 - 1	2011	Wedge gate and resilient seal valves for waterworks: Part 1: General	PSL
SANS 664 - 2	2011	Wedge gate and resilient seal valves for waterworks: Part 2 Wedge gate valves	PSL
SANS 664 - 3	2011	Wedge gate and resilient seal valves for waterworks: Part 3 Resilient seal valves	PSL
SANS 665-1	2012	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 1	PSL
SANS 665-2	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 2 - Wedge Gate Valves	PSL
SANS 665-3	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 3 - Resilient Seal Valves	PSL
SANS 675	2009	Zinc coated fencing wire	Gabion work, General works
SANS 676	2010	Reinforced concrete pressure pipes	PSL, PSLE, PSLE, PSLE
SANS 677	2010	Concrete non – pressure pipes	PSLE, PSLE
SANS 719	2008	Electric welded low carbon steel pipes for aqueous fluids (large bore) (200mm nominal bore to 2230mm)	PSL
SANS 763	1997	Specifying hot dipped galvanising	PSG, PSMM
SANS 830	2009	Performance standards in building - Principles for their preparation and factors to be considered	PSG
SANS 863	2011	Continuous totalizing automatic weighing instruments - Belt weighers	PSG
SANS 878	2012	Ready mixed concrete	PSG
SANS 929	2008	Plywood and composite board	PSLE
SANS 966-1	2014	Components of pressure pipe systems Part 1: Unplasticized poly(vinyl chloride) (PVC-U) pressure pipe systems	PSLC, PSLE
SANS 966-2	2013	Components of pressure pipe systems Part 2: Unplasticized poly(vinyl chloride) (PVC-M) pressure pipe systems	PSL
SANS 974-1		Rubber gaskets	PSLE
SANS 1083	2006	Aggregates from natural resources – Aggregates for concrete	PSG, PSMF
SANS 1085		Concrete testing	PSG
SANS 1090	2009	Aggregates from natural resources - Fine aggregates for plaster and mortar	PA_Brickwork
SANS 1117	2007	Plastic wrappings for the protection of steel pipelines	PSL



Specification	Year	Title	Applicable to:
SANS 1123	2017	Pipe Flanges	PSL
SANS 1215	2008	Concrete masonry units	PSLE
SANS 1217	2015	Internal and external organic coating protection of buried steel pipelines	PSL
SANS 1294	2012	Precast concrete manhole sections and components	PS, PSL, PSG, PSLC, PSLE, PSLE
SANS 1491 - 1 Super	2005	Portland cement extenders - Ground granulated blast furnace slag (GGBS)	PSG
SANS 1491 - 2 Super	2005	Portland cement extenders - Pulverised Fly Ash (PFA)	PSG
SANS 1491 - 3 Super		Portland cement extenders- Condensed Silica Fume (CSF)	PSG
SANS 1529		Mechanical Water meters - potable water	PSL
SANS 1551 - 1	2008	Check valves (flanged and wafer types): Part 1: PN Series	PSL
SANS 1580	2005	Hexagonal steel wire mesh gabions and revet mattresses	PSDK
SANS 1671-1	2007	Welding of Thermoplastics - Machines and equipment - Heated tool welding	PSL
SANS 1700-1 - 1	2010	Fasteners Part 1: Terminology and nomenclature Section 1: Bolts, screws, nuts and accessories	PSL, PSH, PSHA
SANS 1700-2 - 1	2003	Fasteners Part 2: Screw threads Section 1: ISO general purposes screw threads - Basic profile - Metric screw threads	PSL, PSH, PSHA
SANS 1700-4 - 1	2003	Fasteners Part 4: Tolerances Section 1: Tolerances for fasteners - Bolts, screws, studs and nuts - Product grades A, B and C	PSL, PSH, PSHA
SANS 1700-5 - 1	2011	Fasteners: Part 5: General requirements and mechanical properties: Section 1: Mechanical properties of fasteners made of carbon steel and alloy steel - Bolts, screws and studs	PSL, PSH, PSHA
SANS 1808 - 1	2017	Water supply and distribution system components - Metallic compression type pipe couplings	PSL
SANS 1808-13	2009	Water supply and distribution system components: Part 13: Diaphragm valves	PSL
SANS 1808-15	2011	Water supply and distribution system components: Part 15: Mechanical backflow-prevention devices	PSL
SANS 1808-31	2010	Water supply and distribution system components: Part 31: Automatic control valves	PSL
SANS 1849	2008	Butterfly valves for general purposes	PSL
SANS 1914	2002	Targeted Construction Procurement. Part 1 – Participation of targeted enterprises	CPG req
SANS 1921 – 1	2018	Construction and Management Requirements for Works Contracts Part 1: General Engineering and Construction Works and where accommodation of traffic is involved	PS
SANS 1921 - 2	2018	Construction and Management Requirements for Works Contracts Part 2: Accommodation of Traffic on Public Roads Occupied by the Contractor	PS
SANS 1921 - 3	2018	Construction and Management Requirements for Works Contracts Part 3: Structural Steelwork	PS

Specification	Year	Title	Applicable to:
SANS 1921 - 4	2018	Construction and Management Requirements for Works Contracts Part 4: Third party management support in works contracts	PS
SANS 1921 - 5	2004	Construction and Management Requirements for Works Contracts Part 3: Earthworks activities which are to be performed by hand	PS
SANS 1921 - 6	2004	Construction and Management Requirements for Works Contracts Part 6: HIV/AIDS Awareness	PS
SANS 3001		General Civil Engineering test methods	
SANS 3001-C03 - 2	2015	Civil Engineering test methods - Part C03-2: Concrete durability index testing - Oxygen permeability test	PSG
SANS 3001-C03 - 3	2015	Civil Engineering test methods - Part C03-3: Concrete durability index testing - Chloride conductivity test	PSG
SANS 3001-GR55	2012	Civil Engineering test methods - Part GR55: Determination of the wet-dry durability of compacted and cured specimens of cementitious stabilised materials by hand brushing	PSG
SANS 6085		Testing of Concrete	PSG
SANS 4074	2003	Natural latex rubber condoms – Requirements and test methods	SANS 1921, PS
SANS 4427 - 1	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Pipes	PSL
SANS 4427 - 2	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Pipes	PSL
SANS 4427 - 3	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Fittings	PSL
SANS 5772	2004	Preparation of steel substrates before the application of paints and related products – surface roughness characteristics of blast cleaned steel surfaces – Profile of blast cleaned surfaces determined by a micrometer profile gauge	PSL, PSH, PSHA, PA_Corrosion Protection
SANS 5836	2007	Effect of fine and coarse aggregate on the shrinkage and expansion of cement: aggregate mixes (mortar prism method)	PSG
SANS 6085	2006	Concrete tests - Initial drying shrinkage and wetting expansion of concrete	PSG
SANS 8779	2010	Plastic pipe systems - Polyethylene (PE) pipes for irrigation - Specifications	PSL
SANS 10064	2011	The preparation of steel surfaces for coating	PA_Corrosion Protection
SANS 10104	1991	Handrailing and balustrading (safety aspects)	PS
SANS 10129	2006	Plastic tape wrapping of steel pipelines	PSL
SANS 10164-1	1980	The structural use of masonry Part 1: Unreinforced masonry walling	General work
SANS 10268	2009	Welding of thermoplastics - Welding processes - Heated tool welding	PSL
SANS 10270	2015	Welding of thermoplastics - Approval of welding procedures and welds	PSL
SANS 10329	2012	The design and construction of sectional steel tanks for storage of liquids at or above ground level	PS

Specification	Year	Title	Applicable to:
SANS 10313	2012	Protection against lightning - Physical damage to structures and life hazard	PS
SANS 10396	2003	Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures	PSL
SANS 16422	2016	Pipes and joints made of orientated unplasticised poly(vinyl chloride) (PVC-O) for the conveyance of water under pressure - Specifications	PSL
SANS 50196 - 1	1994	Methods of testing cement Part 1: Determination of strength	PSG
SANS 50196 - 2		Methods of testing cement Part 2: Chemical Analysis of cement	PSG
SANS 50196 - 3	1994	Methods of testing cement Part 3: Determination of setting times and soundness	PSG
SANS 50196 - 4	1993	Methods of testing cement Part 4: Quantitative Determination of constituents	PSG
SANS 50196 - 5	1994	Methods of testing cement Part 5: Pozzolanicity for pozzolanic cement	PSG
SANS 50196 - 6	1989	Methods of testing cement Part 6: Determination of fineness	PSG
SANS 50196 - 7		Methods of testing cement Part 7: Methods of taking and preparing samples of cement	PSG
SANS 50413 - 1	1994	Masonry cement: Composition, specifications and conformity criteria	PSG
SANS 50413 - 2	1994	Masonry cement: Part 2: Test methods	PSG
SANS 50197 - 1	2013	Cement Part1: Composition, specifications and conformity criteria for common cements	PSG
SANS 50934 - 2	2001	Admixtures for concrete, mortar and grout: Part 2: Concrete admixtures, Definitions, requirements, conformity, marking and labelling	PSG
SANS 50934 - 6	2011	Admixtures for concrete, mortar and grout Part 6: Sampling, conformity control and evaluation of conformity	PSG
SANS 51317 - 2	2009	Road restraint systems Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers.	PSMM, PS
SANS 53263 - 1	2011	Silica fume for concrete Part1: Definitions, requirements and conformity criteria	PSG
SANS 53263 - 2	2011	Silica fume for concrete Part 2: Conformity evaluation	PSG

### C3.3.3 APPLICABLE INTERNATIONAL SPECIFICATIONS

The following international specifications are referred to in this document and/or are relevant to the Contract and the Contractor is to obtain copies from the relevant authorities as required for the execution of the Works:

Specification	Year	Title	Applicable to:
ACI 1305 R-77		Recommended practise for hot weather concreting	PSG
ANSI/API 5L: latest edition at time for tender		Specification for Line Pipe.	PSL
API 1104: 20th edition		Welding of Pipelines and Related Facilities.	PSL
ASTM A234/A234M-11a		Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service	PSL
ASTM C232-99		Standard Specification for Chromium-Vanadium Alloy Steel Valve Spring Quality Wire	PSG
BS 10	2009	Flange drilling patterns	PSL
BS 1200	1976	Specification for building sand from natural resources	PA_Brickwork
BS 1387		Non alloy steel tubes suitable for welding and threading	PSHA
BS 1881:124	2015	Testing concrete: Methods for analysis of hardened concrete	PSG
BS 2571	1990	Specification for general purpose flexible PVC compounds for moulding and extrusion	PSL
BS 5135	1984	Specification for Arc welding of carbon and carbon manganese steels	PSG
BS 5155 Super	1984	Specification for butterfly valves	PSL
BS 534	1990	Steel pipes, joints and specials for water and sewage	PSL
BS 537		Specification for low carbon 17/12 chromium-nickel-molybdenum corrosion-resisting steel sheet and strip (500Mpa)	PSL
BS 4504		Flange drilling patterns	PSL
BS EN 485-2	2016	Aluminium and aluminium alloys. Sheet, strip and plate Mechanical properties.	PSMM
BS EN 593	2017	Industrial valves. Metallic butterfly valves for general purposes	PSL
BS EN 1092	2018	Flanges and their Joints – Circular flanges for pipes, valves, fittings and accessories, PN designated steel flanges	PSL
BS EN 10224	2002	Non alloy steel tubes and fittings for the conveyance of water and other aqueous liquids	PSL
BS EN 10240	1998	Internal and or external protective coatings for steel tubes. Specification for hot dipped galvanized coatings applied in automatic plants	PSL, PA_Corrosion Protection
BS EN 10311	2005	Joints for the connection of steel tubes and fittings for the conveyance of water and other aqueous liquids	PSL
EN 197-1	1992	Cement Part 1 - Composition, specifications and conformity criteria for common cements	PSG
ISO 1133-1	2011	Plastics - Determination of the melt mass flow rate (MFR) and melt volume flow rate (MVR) of thermoplastics - Part1: Standard method	PSL

Specification	Year	Title	Applicable to:
ISO 1456	2009	Metallic and other inorganic coatings - Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and copper plus nickel plus chromium	PSL, PSH, PSHA
ISO 1458	2002	Metallic coatings: Electrodeposited	PSL, PSH, PSHA
ISO 1461	2009	Hot dipped galvanised coatings on fabricated iron and steel articles - Specifications and test methods	PSL, PSH, PSHA
ISO 4074	2014	Natural rubber latex male condoms	SANS 1921, PS
ISO 4427-1	2019	Plastic piping systems for water supply and for drainage and sewage under pressure - Polyethylene (PE) - Part 1: General	PSL
ISO 4427-2	2019	Plastic piping systems for water supply and for drainage and sewage under pressure - Polyethylene (PE) - Part 2: Pipes	PSL
ISO 4427-3	2007	Plastic piping systems - Polyethylene (PE) pipes and fittings for water - Part 3	PSL
ISO 4998	2014	Continuous hot dip zinc coated carbon steel sheet of structural quality	PSL, PSH, PSHA
ISO 8501-1	2007	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings	PSL, PSH, PSHA
ISO 8503-1	2012	Preparation of steel substrates before application of paints and related products - Surface preparation methods - Part1: General principles	PSL, PSH, PSHA
ISO 8504-1	2019	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast cleaned steel substrates - Part1: Specification and definitions for ISO surface profile comparators for the assessment of abrasive blast cleaned surfaces	PSL, PSH, PSHA
ISO 3575	2016	Continuous hot dip zinc coated carbon steel of commercial, lock forming and drawing grades	PSH, PSHA
ISO 12176-1	2107	Plastics pipes and fittings - Equipment for fusion jointing polyethylene systems - Part 1: Butt fusion	PSL
ISO 14713-1	2017	Zinc coatings - guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part1: General principles of design and corrosion resistance	PSH, PSHA
ISO 21307	2017	Plastics pipes and fittings - Butt fusion jointing procedures for PE piping systems	PSL
SIS 05 59 00	1967	Pictorial surface preparation standards for painting steel surfaces	PSHA
TMH 1	1986	Standard Method of Testing Road Construction Materials	Road Construction

### **C3.3.4: AMENDMENTS TO THE STANDARD PROJECT SPECIFICATIONS**

#### **PREAMBLE**

In certain clauses in the standard specifications, allowance is made for a choice to be specified in the project specifications between alternative materials or methods of construction, and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the project specifications.

The variations to and additions to the standard specifications are included under section defining the Amended Specifications and are prefixed "P", followed by the applicable clause reference. The clauses and payment items dealt with in this part of the project specifications are numbered such that each item referred to in the standard specification is clearly reflected. The prefix "PSA" indicates an amendment to SABS 1200A, "PSC" to SABS 1200C, etc. The numbers following these prefixes are the relevant Clause numbers in SABS 1200.

Any reference made in this document to "The Engineer" shall be read to mean "The Employer's Agent" as per the definition in the Contract.

Amendments as detailed, take precedence over the Standard Specification.

For the construction management requirements of works contracts, SANS 1921, volumes 1 to 6 are applicable. Although not bound in, nor issued with this document, the following volumes of the SANS 1921 standard specification shall form part of this Contract and are amended below:

Part 1 General engineering and construction works

Part 2 Accommodation of traffic on public roads occupied by the contractor

Part 6 HIV Aids awareness

In the event of any discrepancy between the Project Specifications and a part or parts of the SABS 1200 Standard Specifications or any other Standard Specification, the Schedule of Quantities or the Drawings, the Project Specifications shall take precedence and shall govern.

It is required that, where work to be executed, or items/materials to be supplied and incorporated into the Works are not specified, that such work and or supply items comply with the requirements of a relevant SANS specification. In some instances, a relevant international specification is required to be adhered to

**PSA GENERAL (SABS 1200 A – 1986)****PSA 2.3 DEFINITIONS**

Replace the Sub-Clause:

**PSA 2.3 a) General**

Add the following definitions:

"General Conditions: The GCC Contract specified for use with this Contract and the Special Conditions of Contract as applicable.

Specified: As specified in the Standardised Specifications, the Drawings or the Project Specifications. Specifications shall have the corresponding meaning."

**PSA 2.3 c) Measurement and payment**

Replace the definitions for fixed charge, time-related charge and value-related charge with the following:

"Fixed charge: A charge that is not subject to adjustment on account of variation in the value of the Contract amount or the Contract time of completion.

Time-related charge: A charge, the amount of which is varied in accordance with the time for completion of the work as adjusted in accordance with the provisions of the Contract.

Value-related charge: A charge, the amount of which is varied pro rata the final value of the measured work executed and valued in accordance with the provisions of the Contract."

**PSA 3 MATERIALS****PSA 3.1 QUALITY**

Add to the Sub-Clause:

Materials specified as being to the approval of a Standard Bureau shall bear the official mark of the appropriate standard.

**PSA 3.3 STORAGE OF MATERIALS (NEW SUB-CLAUSE)**

Add new Sub-clause:

The Contractor must make provision at his own expense for the proper storage of all materials in accordance with the manufacturer's recommendations. All cement must be stored in a rain proof and ventilated store and every precaution must be taken to keep it dry. Any bags of cement that show any degree of hydration or setting shall be removed from the site and replaced at the Contractor's expense. Valves need to be stored on hard surfaced areas, well off the surfaced area on pallets or similar, not in direct sun light.

**PSA 3.4 ORDERING OF MATERIALS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time and should therefore be considered to be only approximate quantities. The liability shall rest entirely and solely with the Contractor to determine before ordering, the required types and quantities of the various materials required for the completion of the Works in accordance with the Specifications and the Drawings issued to the Contractor for construction purposes. Any reliance placed by the Contractor on the estimated quantities stated in the Schedule of Quantities will be a Contractor's risk.

**PSA 4 PLANT - CONDITION OF PLANT AND MACHINERY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Any plant and machinery utilized on this Contract shall be in a 100% serviceable and roadworthy condition and shall be well maintained at all times. No plant and machinery shall be allowed to operate if it emits excessive noise, is smoking or is dripping oil. The Engineer's instruction in this regard will be final.

No plant and machinery will be allowed to undergo scheduled services on site or at construction site offices. All scheduled services will be undertaken at the Contractor's workshops, away from the construction site. These workshops shall be operated in a legal manner whereby all Environmental and other applicable laws shall be upheld. No fuel, oil or grease shall be allowed to drain into soak pits or the storm water system without the required grease traps.

Refueling of plant and machinery on site shall take place in such a manner that no fuel is spilt at any stage of the operation.

The Contractor shall only utilize "self greasing" plant and equipment on site to ensure that no need exists to do regular greasing maintenance to plant and machinery on site.

Any unplanned spillage of fuels, grease and/or oil shall be attended to immediately in an appropriate manner.

The requirements of the EMP shall be adhered to at all times during construction.

**PSA 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES**

Delete the first sentence and add the following:

Neither housing nor shelters are to be made available for the Contractor's Employees on site, and the Contractor shall make his own arrangements if need be to transport the staff to and from site on a daily basis.

Refer to the requirements of the form of contract in this regard.

**PSA 5 CONSTRUCTION****PSA 5.1 SURVEY**

Add the following:

The Contractor must note that a limited amount of survey control has been provided. The Contractor will be required to verify the accuracy of such and shall be held responsible for any errors in the setting out of the works which may arise from the usage of this survey control.



**PSA 5.1.1 Setting Out Of The Works**

Add to Sub-Clause:

Prior to the commencement of any setting out the Contractor shall be responsible for verifying the correctness of the basic survey control points.

After clearing the site and before commencing any excavation work, the Contractor shall undertake a tachy survey with readings taken at a maximum grid spacing of 5 x 5 metres and shall include all feature lines.

The survey data must be in the format specified in the project specification and must be handed to the Engineer at least 3 working days before the commencement of excavation or the construction of fill.

Monthly claim statements must be accompanied by detailed tachy survey data substantiating volume calculations.

**PSA 5.1.2 Preservation And Replacement Of Beacons And Pegs Subject To Land Survey Act**

Add to the Sub-Clause:

All survey reference marks that have been placed in the ground shall be clearly marked and protected by the erection of three fencing standards placed in a triangular formation around the reference peg.

**PSA 5.9 COMPLETION OF WORKS (NEW SUB-CLAUSE)**

Add new Sub-clause:

Upon completion of the Works, the Contractor shall restore and rehabilitate the site as required in terms of the Environmental Management Plan.

**PSA 6 TOLERANCES****PSA 6.2 DEGREES OF ACCURACY**

Add to Sub-clause:

Degree of Accuracy II shall be applicable to the whole of the works but PSG 6 of SABS 1200G – 1982 shall also be applicable and in instances where PSG 6 has a more stringent requirement, then PSG 6 shall apply.

**PSA 7 TESTING****PSA 7.1 PRINCIPLES****PSA 7.1.1 Checking**

Add to Sub-Clause:

The Contractor shall provide the Employer's Representative with a minimum of 24 hours notice when a section of the Works is available for acceptance control testing and shall allow a further full working day for the processing of results.

**PSA 7.2      APPROVED LABORATORIES**

Add to Sub-Clause:

Materials testing may either be carried out in an approved commercial laboratory or in a dedicated site laboratory with sufficient suitable equipment to carry out all routine tests required by the Specifications and for carrying out any other tests which he may deem necessary for the proper quality control of the Works. SANAS registered laboratories are to be used.

**PSA 7.3      METHODS OF TEST**

Add to Sub-Clause:

Density control testing (Method A10(b) of TMH1) shall be carried out using an approved "nuclear" density testing machine (Troxler or similar approved). Density measurement shall be determined using Method C (Direct Transmission) for all layers including the crushed stone base. To this end, the Contractor shall use suitable equipment as necessary for the making of the hole for the probe of the nuclear device, without causing undue damage or stress to the surrounding layer. Method A - Flush Backscatter shall not be used. The Contractor shall also provide a suitably qualified materials tester who will be responsible for taking all samples, density control testing etc. required for his Process Control. The Contractor is responsible for establishment of MODS for excavated material to be re used and stockpile control shall be such that specific material used at any specific location, can be traced back to origin and MOD determined.

**PSA 7.5      SITE CONTROL AND ACCEPTANCE TESTING**

Add new Sub-clause:

The onus rests on the Contractor to produce work which conforms in quality and accuracy of detail to the requirements of the specification and drawings, and the Contractor must, at his own expense, institute a quality control system and provide the necessary competent staff and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of process control, including testing, so carried out by the Contractor, shall be deemed to be included in the rates tendered for the relevant items of work. The results of the above test must be presented to the Employer's Representative upon request.

The Employer's Representative, may at his discretion order acceptance testing by an independent approved laboratory. Where the tests reveal that the material used in the construction or the tolerance standard achieved does not comply with the applicable requirements of the specification, the costs of these check tests will be borne by the Contractor.

**PSA 8      MEASUREMENT AND PAYMENT****PSA 8.2.1      Fixed Charge And Value Related Items**

Delete Sub-Clause and replace with:

Each item should be priced separately and, subject to the Engineer certifying in terms of the GCC Contract that the work has been done, payment will be made as follows:

- 1) The total amount due when the certified value fixed charge items in this section is less than 5% of the net contract price;

- 2) When the certified value of fixed charge items in this section is greater than 5% of the net contract price, payment will be limited to 5% of the net contract price. The remainder will be paid when the value of the work done under the contract, excluding the value of fixed charge items in this section, is greater than 50% of the net contract price, excluding the value of fixed charge items in this section.

#### **PSA 8.2.2 Time Related Items**

Delete lines 3 and 4 and replace with:

....incremental amounts (calculated by the division of the remainder of the tendered sum by the number of remaining months of the duration of construction as assessed by the Engineer) will be...

Add to the Sub-Clause:

Notwithstanding the provisions of Sub-Clause PSA 8.2.2, an approved extension of time will not qualify the Contractor to receive any payment for that portion of fixed charge and value-related items which have become regarded as "time-related" items in terms of PSA 8.2.1 above.

#### **PSA 8.3.5 De-Establishment of Site**

Add new Sub Clause:

The unit of measurement shall be Number Of (No.).

The Tendered rate shall cover the cost of each site de-establishment where instructed by the Employers Representative, this will include the de-establishment of all facilities on site and plant if necessary and making the site safe.

#### **PSA 8.3.6 Re-Establishment on Site**

Add new Sub Clause:

The unit of measurement shall be Number Of (No.).

The Tendered rate shall cover the cost of each site re-establishment where instructed by the Employers Representative, this will include the re-establishment of all facilities as per PS 3.6 and SANS 1200 A 8.3.2.

#### **PSA 8.4.6 Acceptance Testing**

Add new Sub-Clause:

A commercial laboratory will carry out acceptance testing as and when directed by the Employer's Representative. (SANAS Registered)

The Contractor will be required to pay the laboratory in full for any testing carried out as directed by the Employer's Representative. These monies will be reimbursed to the Contractor.

The Contractor will still be required to carry out his own process control testing.

**PSA 8.7 DAYWORKS**

Add to Sub-Clause:

No work shall be measured on a daywork basis unless the Contractor has been instructed to do so by the Employer's Representative in writing. All work carried out on dayworks shall be recorded in detail on a daily basis. Dayworks plant and labour returns shall be submitted to the Employer's Representative daily for consideration and approval.

No transport costs to and from the site will be paid for plant removed from site at the Contractor's request or where such plant is listed in the Schedule of Plant and Equipment as available for this Contract. .

**PSA 8.8 TEMPORARY WORKS – DEALING WITH WATER ON WORKS**

Add new Sub-Clause:

The tendered sum(s) and rates shall cover the cost of providing, operating and maintaining the necessary equipment and other temporary works for dealing with groundwater in trenches and excavations.

**PSAB ENGINEER'S OFFICE (SABS 1200AB)**

Amend clause to read "Employers Representatives Office".

**PSAB 3 MATERIALS****PSAB 3.1 NAME BOARDS**

Replace Clause 3.1 with:

A notice board as detailed in Part C4: Site Information is to be erected to the satisfaction of the Employer's Representative.

**PSAB 3.2 OFFICE BUILDINGS**

Add the following:

The Employers Agent office shall have a floor area of at least 18m<sup>2</sup>. In addition, the offices shall be fitted with:

- Correctly sized air conditioning units.
- Refrigerator of 100l capacity
- 4 No 15 Amp earther power plug points reticulated within the offices for computer powering and other office equipment.
- An approved stand and holders for 20 vertically hung A0 drawings.
- An approved colour printer and scanner to print and scan A3 documents adequate printer cartridges shall be provided throughout the contract duration
- Provide, install, and maintain a water dispenser and ensure the continuous supply of clean, potable water for the duration of the contract.
- A lockable cabinet
- 3 desks, 3 chairs and shelves.
- A drawing table shall be supplied to each office, capable of spreading an A0 drawing satisfactorily.
- 4 carports shall be provided for exclusive use of the Employers Agent and the Employer. The carports shall have suitable roof cladding and be covered on 3 sides

The offices must comply with the requirements of Clause 3.2 of SANS 1200AB and must be located in a shady area or be protected from the sun by shade cloth suspended over its roof.

In addition to the above comfortable, air-conditioned accommodation shall be made available for holding regular site meetings. This accommodation must comfortably cater for up to 15 persons seated around a table. The Contractor is to ensure that the boardroom allows for the following:

- Correctly sized air conditioning units.
- Refrigerator of 100l capacity
- 8 No 15 Amp earther power plug points reticulated within the offices for computer powering and other equipment.
- Projector and screen.

- Tables, chairs and shelves.

### **PSAB 3.3      TEMPORARY OFFICE BUILDINGS FOR THE EMPLOYERS STAFF**

Add a new clause as follows:

The Employers Staff temporary office shall include the following for the entire contract period:

- Offices to comfortably house 5 individuals.
- Correctly sized air conditioning units.
- 2 x Refrigerators of 100l capacity
- 6 No 15 Amp earther power plug points reticulated within the offices for computer powering and other office equipment.
- An approved colour printer and scanner to print and scan A3 documents adequate printer cartridges shall be provided throughout the contract duration
- Provide, install, and maintain a water dispenser and ensure the continuous supply of clean, potable water for the duration of the contract.
- 2 x lockable cabinets
- Desks, chairs and shelves.

The offices must comply with the requirements of Clause 3.2 of SANS 1200AB and must be located in a shady area or be protected from the sun by shade cloth suspended over its roof.

### **PSAB 4.1      TELEPHONE**

Add to sub clause:

Time Related charges of **R3000** per month shall be included for airtime for use by the Engineer for the duration of the Contract.

A wireless internet service is to be provided at the site offices with minimum **50GB** data access per month for Employers Agent and Employer's use.

### **PSAB 5      CONSTRUCTION**

#### **PSAB 5.5      SURVEY ASSISTANTS**

Delete the first sentence and substitute the following:

Survey assistants are to be made available to the Engineer when required.

#### **PSAB 5.6      SURVEY EQUIPMENT (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The Contractor shall provide the following survey equipment on the site as and when required by the Engineer Assistants:

- 1 No. Automatic Level(Leica 728) with aluminium tripod (Leica GST05L)
- 1No. Leica CLR102 Telescopic 5M , 4 section Levelling staff

- 1 No. Staff Angle Bubble
- 1 No. 2KG Hammer
- 1 No. Plumb bob
- 1No. Metal Change points
- 1No. 30m Reinforced Glass Fibre Tape
- 1 No. Leica D3 Laser Distance meter (Instead of a 5 M retractable steel tape)
- 1 No. Elcometer 456 Coating Thickness Gauge

**PSC SITE CLEARANCE (SABS 1200 C – 1980 AS AMENDED 1982)****PSC 3 MATERIALS****PSC 3.1 DISPOSAL OF MATERIALS**

Add the following:

The free haul distance for this contract is unlimited.

Contractors are to note that no overhaul will be paid. Material obtained from clearing must be disposed of offsite by the Contractor at his expense. The Contractor will be held responsible for observing the by-laws and regulations of the relevant local authority. Burning of combustible material shall not be allowed. The site is situated adjacent to existing buildings and dust control is to be maintained at all times

The requirements of the EMP, if applicable, are to be met at all times.

**PSC 5 CONSTRUCTION****PSC 5.1 AREAS TO BE CLEARED AND GRUBBED**

Add to Sub-Clause:

The Employer wishes to control and limit erosion as well as preserve the existing natural bush and trees as far as possible. The areas to be cleared must be kept to a minimum but be such as not to affect the quality of the work and hamper the efficient execution of the Contract. The Contractor shall also take all necessary precautions to protect the existing fauna and flora during clearing and construction operations.

The Employer's Representative reserves the right to order manual clearing and grubbing should the conditions warrant this.

**PSC 5.3 CLEARING**

Add to the Sub-Clause:

Where pipes are to be laid the Contractor shall be allowed to clear and grub the construction corridor for the maximum width of the allowed working space corridor width as specified. No construction activities may be undertaken outside the construction corridor demarcated by the temporary fencing to be erected.

All trees with a girth more than 250 mm or a height of more than 2,5m within this strip, shall be protected and may only be trimmed or removed after a written order by the Employer's Representative.

No site clearance activities shall commence before the issuing of an "Access Certificate" by the Employer's Representative. Such access certificate" is not the same as "provision of access" as required by the Conditions of Contract. It merely indicates that the Engineer has verified that preconditions for work in the proposed work area may commence as pre conditions have been met.

The tendered rates for site clearance shall be deemed to include for the removal of waste from site and the disposal thereof.



With reference to SABS 1200 C clauses 5.3 and 5.4 and 8.2.1, payment will be made for clearing and grubbing only where required and to an extent that will enable excavation of trenches to proceed and not necessarily along the entire length of the pipeline. Disturbance of vegetation and roots should as far as possible be confined to the width of the trench, except that vegetation may be cut back to provide reasonable access and working space, without destroying the potential for re-growth.

**PSC 5.4 GRUBBING**

In the fourth line delete "200mm" and substitute 300mm.

**PSC 5.6 CONSERVATION OF TOPSOIL**

Add to the Sub-Clause:

All topsoil shall be conserved for later use by stockpiling clear of the working area.

**PSC 8 MEASUREMENT AND PAYMENT**

**PSC 8.2.1 Clear And Grub**

Replace the first line with the following:

The area designated by the Employer's Representative to be cleared and grubbed will be measured in square metre to the nearest square metre or,

The unit of measurement shall be square metre (m<sup>2</sup>).

**PSC 8.2.4 Reclear surfaces (only on instructions from the Engineer)**

Add to the Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

**PSC 8.2.5 Take Down Existing Fences**

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for storing and reinstatement of the fence as directed by Employer's Representative on site.

**PSC 8.2.7 Dismantle And Remove Existing Services**

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for stockpiling of dismantled services for returning to the Employers depots, where required.

The rate for removal of Asbestos Cement pipelines/items shall cover the cost of the cutting of the existing pipe, dismantling, lifting and stockpiling in accordance to Construction

Regulations, 2014, Asbestos Regulations, 2001 and Environmental Management Plan, PEM 5.11 Hazardous Waste.

#### **PSC 8.2.8 Demolish And Remove Existing Structures/Buildings**

Add to the Sub-Clause:

The tendered rate shall include transporting rubble to an approved spoil site.

The unit of measurement shall be number (No.)

#### **PSC 8.2.10 Remove Topsoil To Stockpile**

Add to the Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The tendered rate shall include full compensation for removing topsoil to a depth of 150mm for the maximum width of the allowed working space corridor width or platform working area and for loading and transporting the material to and from a stockpile, including maintaining, in the vicinity of the site of works. No indiscriminate clearing and spoiling shall be allowed.

Where topsoil conditions allow for removal more than 150mm deep, the Engineer may instruct accordingly up to a depth of 300mm.

#### **PSC 8.2.11 Saw Cutting Of Existing Asphalt Surface (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the asphalt cut according to the plans or as instructed by the Employer's Representative. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of asphalt, according to the specification which calls for a double cut on each side of the excavation if required.

#### **PSC 8.2.12 Saw Cutting Of Existing Concrete (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the concrete cut according to the plans or as instructed by the Employer's Representative. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of concrete, according to the specification which calls for a single cut.

#### **PSC 8.2.13 Remove Existing Road Asphalt Surfacing To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all asphalt surfacing as instructed by the Employer's Representative. The rate shall take into

account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.14 Remove Existing Gravel Layerworks To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall include for the selective removal of existing gravel layerworks to the required depth as instructed by the Employer's Representative, loading and transporting to spoil as per Clause PSC 3.1: Disposal of Material. The rate shall take into account that this work will have to be carried out in more than one operation depending on the construction programme and traffic accommodation.

#### **PSC 8.2.15 Remove Existing Concrete Surfacing To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete surfacing as instructed by Employer's Representative. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.16 Remove Along Edges Of Road And Footway (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre length (m).

The rate shall include the removal of the concrete kerbing and associated concrete backing, loading, transporting and disposal to spoil sites selected by the Contractor and approved by the Employer's Representative.

#### **PSC 8.2.17 Dismantle, Storing And Re-Erection Of Road Signs**

Add new Sub-Clause:

The unit of measurement shall be number (No).

Exceeding but not exceeding surface area of: 0 - 2,0m<sup>2</sup>

The unit of measure shall be the number of road signs dismantled, stored and re-erected as instructed by the Employer's Representative.

The rate shall include the cost of dismantling and re-erection of all components of the road sign, the transporting to and from storage, all costs associated with the storage of the road signs, all labour costs involved in the process of dismantling and re-erection and the backfilling, shaping and trimming of any sign post holes.

#### **PSC 8.2.18 Remove Existing Concrete Kerbing & Channeling**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete kerbing and channelling as instructed by Employer's Representative. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.19 REMOVAL AND DISPOSAL OF EFFLUENT**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall cover the cost of removal activities (draining pond), all necessary equipment, loading, transporting of effluent removed from the pond/drying bed. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation. The rate shall also take into account all treatment processes required to ensure the effluent can be safely disposed.

#### **PSC 8.2.20 REMOVAL AND DISPOSAL OF SLUDGE/RESIDUE**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall cover the cost of removal activities (residue/sludge), all necessary equipment, loading, transporting from the tank. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation. The rate shall also take into account all treatment processes required to ensure the sludge can be safely disposed.

#### **PSC 8.2.21 Clear debris, material, vegetation, residue**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The area designated by the Employer's Representative to be cleared of debris, material, vegetation, residue will be measured in cubic metres. The rate shall include of disposal of material safely and in accordance with applicable standards for hazardous materials disposal.

#### **PSC 8.2.22 Reclear surfaces (only on instructions from the Engineer)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The area designated by the Employer's Representative to be cleared of debris, material, vegetation, residue will be measured in cubic metres. The rate shall include of disposal of material safely and in accordance with applicable standards for hazardous materials disposal.

**PSD EARTHWORKS (SABS 1200 D – 1988 AS AMENDED 1990)****PSD 2 INTERPRETATIONS****PSD 2.1.2 Supporting Specifications**

Delete Sub-Clause and replace with:

Any of the other SABS 1200 Specifications (latest editions) may form part of the Contract Documents.

**PSD 2.3 DEFINITIONS**

Delete the sentence under **Borrow** and replace with:

**Borrow:** Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorised widening of excavations. 'Borrow' shall have a corresponding meaning.

Delete the sentence under **Restricted Excavation** and replace with:

**Restricted excavation** - An excavation so restricted in area or width as to preclude removal of material by excavating machinery used for bulk excavation measured in terms of Sub-Clause 8.3.2. Restricted excavation may be carried out by smaller machinery or by hand, as selected by the Contractor. The extent of restricted excavation shall be as scheduled and/or shown on the drawings. All other excavation shall be regarded as bulk excavation.

Delete the sentence under **Specified Density** and replace with:

**Specified density:** The specified dry density expressed as a percentage of modified AASHTO dry density.

Delete the sentence under **Stockpile** and replace with:

**Stockpile** (Verb): The process of selecting and as may be necessary, loading, transporting and offloading material in a designated area for later use and a specific purpose.

Add the following definitions:

**Fill:** An embankment or terrace constructed from material obtained from excavations or borrow. In roads it includes the earthworks up to the underside of the selected subgrade level.

**Fill** (material): Material used for the construction of an embankment or terrace.

**Roadbed:** The natural in situ material on which the fill, or in the absence of fill, any pavement layers, are to be constructed.

**PSD 3 MATERIALS****PSD 3.1 CLASSIFICATION**

Delete Clause 3.1 and replace with the following:

Classification of Excavation

For the purpose of measurement and payment excavated material shall be classified under the following three headings:

### Rock

Rock shall be held to be undecomposed boulders exceeding 0,2m<sup>3</sup> in volume and solid rock occurring in bulk, banks or ledges, the excavation of which would normally necessitate the use of explosives and shall have a total rating in excess of 75, as defined in the following Table. In addition, when tested with Type L Schmidt hammer, the rock shall have a rebound value above 30, when tested vertically downwards.

### Hard Material

Hard material shall be held to be the material other than rock which needs to be loosened by pneumatic, hydraulic or mechanical breakers prior to being excavated and shall have a total rating between 25-75 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, it shall have a rebound value in the range 5-30 when tested vertically downwards.

### Soft Material

Soft material will be held to be material not falling into the categories of rock and hard material such as gravel, earth, sand, silt, clay and completely weathered rock and shall have a total rating less the 25 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, it shall have a rebound value less than 5 when tested vertically downwards.

**Table 1: Rock Classification**

CLASS	I	II	I	IV	V
DESCRIPTION	Very Good Rock	Good Rock	Fair Rock	Poor Rock	Very Poor Rock
Seismic Velocity (m/s)	>>2 150	2 150-1 850	1 850-1 500	1 500-1 200	1 200-450
Rating	26	24	20	12	5
Rock Hardness Rating	Extremely Hard 10	Very hard 5	Hard 2	Soft 1	Very soft 0
Rock Weathering Rating	Unweathered 9	Slightly Weathered 7	Weathered 5	Highly Weathered 3	Completely Weathered 1
Joint Spacing (mm)	>>3 000	3 000-1 000	1 000-300	300-50	<<50
Rating	30	25	20	10	5
Joint Continuity Rating	Non Continuous 5	Slightly Continuous 5	Continuous -no gouge 3	Continuous Some gouge 0	Continuous With gouge 0
Joint Gouge Rating	No Separation 5	Slight Separation 5	Separation <<1mm 4	Gouge <<5mm 3	Gouge >>5mm 1
Strike and Dip Orientation Rating	Very Unfavourable 15	Unfavourable 13	Slight Unfavourable 10	Favourable 5	Very Favourable 3
Total Rating	100-90	90-70	70-50	50-25	<25

**PSD 3.1.3 General**

Add new Sub-Clause:

The method of excavation shall be at the discretion of the Contractor provided that the work complies with the specification and the following requirements:

Excavations shall be confined within the limits defined by the drawings or as instructed by the Employer's Representative.

Surfaces in excavations shall at all times be formed to shed stormwater and groundwater without ponding.

- where excavation is accomplished by blasting and the material is required for fill, sufficient fragmentation shall be attained to allow the material to be used as fill; and
- excavated faces in abandoned borrow shall be formed to stable slopes.

Since borrow sites are usually required for future development, the Contractor shall not excavate haphazardly and strict level control shall be maintained at all times. Site design levels will be supplied to the Contractor and he shall ensure that these levels are strictly adhered to. Where topsoil is to be removed prior to excavation this will be considered a separate operation and will be measured as such.

The Contractor or his representative shall jointly with the Employer's Representative keep a record of the depths, dimensions and classification of excavation as defined in clause PSD 3.1.

**PSD 3.1.4 Overbreak**

Add new Sub-Clause:

Excavation carried out in excess of the specified depth, unless authorised by the Engineer, shall be made up with concrete class 15/26 or other approved material, as directed by the Engineer, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Engineer.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes the softened material shall be removed and replaced by concrete or other approved material as directed by the Engineer at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

**PSD 3.2 CLASSIFICATION FOR PLACING PURPOSES****PSD 3.2.1 Material Suitable For Embankments And Terraces**

Delete the Sub-clause and replace with **SABS 1200DA 3.2.1, GENERAL**, with the following modifications:

In the first sentence delete "150mm" and substitute with "100mm"

Add to Sub-clause:

The material for the embankments shall be compacted to 95% modified AASHTO density.

### **PSD 3.2.2 Material Suitable For Replacing Overbreak In Excavation For Foundations**

Delete Sub-clause and replace with:

Excavation carried out in excess of the specified depth, unless shown on the drawings or authorised by the Employer's Representative, shall be made up with concrete class 15/19 or other approved material, as directed by the Employer's Representative, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Employer's Representative.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes. The softened material shall be removed and replaced by concrete or other approved material as directed by the Employer's Representative at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

## **PSD 3.3 SELECTION**

### **PSD 3.3.1 General**

Delete Sub-Clause and replace with:

All topsoil requires to be conserved for this Contract. Topsoil shall be preserved by stockpiling for later use and be re-spread over the area where removal took place. The requirements of the EMP are to be met at all times.

### **PSD 3.3.3 Stockpile Sites**

Add new Sub-Clause:

Stockpile sites shall be prepared by clearing and light grading. The contractor shall ensure that windblown sand will be kept to a minimum so as not to constitute a public nuisance.

### **PSD 3.3.4 Selection In Borrow Pits And Excavations**

Add new Sub-Clause:

The approval of a borrow area for a certain purpose does not necessarily mean that all material within that area is suitable for the specified purpose. What it does mean, is that the borrow area contains some suitable material. The onus is on the Contractor to ensure that only material that is deemed suitable, is removed and used for the specified purpose. Where the Contractor is required to select material from excavations for a specific purpose, the above provisions relating to borrow areas shall apply mutatis mutandis to excavations. The Contractor shall not waste or contaminate material that has been selected for a specific purpose.



**PSD 4 PLANT****PSD 4.1 GENERAL**

Replace clause 4.1. with the following:

In general, the Contractor may use whatever plant he considers appropriate to construct the work to required specification.

In the case of backfill against structures, however, no earthmoving equipment with a mass exceeding 1 000 kg shall be used within a zone of restricted placing, normally within 2,5m of any concrete face, unless otherwise specified.

**PSD 5 CONSTRUCTION****PSD 5.1 PRECAUTIONS****PSD 5.1.1.1 Barricading and Lighting**

Change heading to read: **BARRICADING/FENCING, LIGHTING, SIGNS AND ACCESS**

Delete Sub-Clause and replace with:

Without limiting any obligation which the Contractor may have in terms of any Act, Ordinance or other legislation, the Contractor shall ensure that all excavations which are accessible to the public or which are adjacent to a public road or thoroughfare, or by which the safety of persons may be endangered, are protected as set out in Clause 13 of the General Safety Regulations of the Occupational Health and Safety Act, 1993. The Contractor shall employ watchmen who are to ensure that barricades, barriers and lights are effective at all times. The Contractor shall, for this purpose, have at its disposal a 24 hour response team that can react to public complaints in this regard or to calls from the watchmen who are employed to ensure effective barricades, barriers and lights at all times.

Barricades are grouped into different categories:

**1.a Barrier Fences without electrical fence –**

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Representative.

**1b. Barrier Fences with electrical fence –**

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres with 20 strand electrical fence to the outside of the property. Also, facing the Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities

are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Representative.

#### **2.a. Rigid Barricades for noise reduction 1.8m high –**

Rigid Barricades for noise reduction shall consist of 1.8m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Representative.

#### **2.b. Rigid Barricades for noise reduction 3m high –**

Rigid Barricades for noise reduction shall consist of 3m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Representative.

### **3. Rigid Barricades for preventing access –**

Rigid Barricades for preventing access, shall be of interlocking modular type, 1.8m high, with a barricade face of at least a Bonox type or similar approved fence type. The barricade shall be capable of being secured to the ground to prevent it from falling over, being bumped over or blown over by the wind. The bottom section of the fence type shall be such that animals cannot get through. Red and white danger tape shall be woven through the fence in order to increase visibility and the tape shall be secured in order to prevent loose ends from flapping in the wind or lying on the ground. Rigid Barricades for preventing access shall typically be required around excavations in road reserves where there is no danger of passing traffic driving into such excavations. Rigid Barricades for preventing access shall be erected as instructed by the Employer's Representative.

### **4. Rigid Barricades for preventing access and visibility –**

Rigid Barricades for preventing access and visibility shall be of the same construction as the Rigid Barricades for preventing access, with the provision that 80% density black shade cloth which is well secured to the fence, shall block out visibility into work areas where same is required. Rigid Barricades for preventing access and visibility shall be erected as instructed by the Employer's Representative.

### **5. Barricades of Armco type or similar approved, fitted into Tarmac surfaces –**

This type of barricade shall consist of the Armco type barrier, fitted to 200mm wooden posts at 3000mm centres, planted 800mm deep into the road surface. The holes for the wooden posts shall be augered in order to limit overbreak. Compaction of the posts shall be with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO. Upon removal of the wooden posts, the post holes shall be backfilled with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO and compaction shall be 100% MOD AASHTO. The final 300mm layer of backfill, onto which the wearing course will be laid, shall consist of G2 material compacted to 97% MOD AASHTO. Barricades of Armco type or similar approved, fitted into Tarmac surfaces shall be erected as instructed by the Employer's Representative.

## 6. New Jersey type barriers or similar approved –

This type of barrier shall be typical of the standard New Jersey concrete barrier or similar approved and shall be erected as instructed by the Employer's Representative. The barriers shall be adequate for containment level H2 as specified in SANS 51317 -2:2009 Part 2.

## 7. Opaque Screen Barrier Fences –

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. The fence shall be fitted with 80% density black shade cloth in order to limit visibility. Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent and visibility into the working corridor is to be limited.

No access into any barricaded area shall be allowed to anybody other than construction workers and representatives of the Employer's Representative who have undergone a site induction course. At each barricaded work front, an authorised person, qualified to un-lock the system, or in the case of Barrier Fences or Rigid Barricades for noise reduction, opening a special gate in the fence or barricade, to grant access to staff, shall be deployed. In the cases where different types of barricades are utilised in conjunction with each other, for example a New Jersey barrier on the one side of the excavation and a Rigid Barricade for preventing access on the other, the ends where transition from one to the other takes place, shall be adequately closed off with suitable barrier type as instructed by the Employer's Representatives. The Contractor shall ensure that access at ends where vehicles have to enter and exit, are controlled.

Access ramps for vehicles and/or pedestrians shall be provided along the route of the work for the purpose of providing access. Suitable barricading and hand rails shall be provided for these access ramps. Where construction is in, or across, public roads; barricades or barriers and temporary road signs shall be erected. All such signs and positioning thereof shall comply with the requirements of the local roads authority.

### General

The tendered rates for barricading shall include the supply, erection, maintenance and relocation of barricading and barriers as required by the Employer's Representative. The requirement to utilise bollards and or traffic cones or any other equipment in order to manage traffic flow and movements, which are not measured as barricades, shall be priced for under the relevant activities and all rates tendered for these activities shall be deemed to include for the use of same.

Where access by property owners is required, through barricaded areas, such access shall be arranged through setting up barricading in such a manner that access to property is possible without access to work areas which requires barricading. All tendered rates for barricading shall be deemed to include for such protected access by property owners.

Although a range of barricades are defined above, the Contract might only require specific types for which items have been allowed for in the Bill of Quantities.

**PSD 5.1.1 Safety**

Add to Sub-clause:

All activities shall be carried out in accordance with the requirements of the relevant clause of the Occupational Health and Safety Act (Act 85 of 1993).

**PSD 5.1.1.2 Safeguarding of Excavations**

Delete the first three lines and substitute the following:

The Contractor or his Agent or Representative appointed in writing shall be deemed to be a person who is competent to pronounce on the safety of all bracing and shoring as set out in the Occupational Health and Safety Act (Act 85 of 1993).

Add to the Sub-Clause:

The Contractor shall provide additional lateral support for all buildings, structures and services affected by his operations as required and deemed to be applicable.

The relevant sums tendered for trenching in the Bill of Quantities shall cover the cost of providing, installing, maintaining and removing lateral support that is adequate for preserving the stability of the existing fences, walls, buildings, structures and services and shall include for productivity rates applicable to a construction process including the deployment of mechanisms require to safeguard excavations.

In sub clause a) delete the words "Machinery and Occupational Safety Act" in the third and fourth lines and substitute "regulations to the Occupational Health and Safety Act, 1993."

**PSD 5.1.1.3 Explosives**

Add to Sub-Clause:

Blasting shall not be carried out without the prior consent of the Employer's Representative. This consent will not be given where in the opinion of the Employer's Representative, blasting may give rise to unnecessary risk or damage to surrounding property when other means of excavation are available to the Contractor. Where consent to blasting is given, such consent shall in no way relieve the Contractor of any of his liabilities under the contract.

The Employer's Representative shall be notified at least 72 hours beforehand of the Contractor's intention to use explosives on site.

It shall be incumbent on the Contractor to make himself aware of restrictions to blasting imposed by electric transmission or telephonic lines, fuel pipelines, or other similar services.

Where the presence and location of such services are known or are shown on the drawings at tender stage the Contractor must make allowance in his rates and programme for restrictions and delays which may result from the restrictions imposed by the relevant authorities.

#### PSD 5.1.1.4 Use of Explosives

Add new Sub-Clause:

Generally, the Contractor shall be permitted to use explosives for breaking up rock and hard material during excavations, for demolishing existing structures and for such other purposes where it may normally be required, subject to the following conditions:

- a) The Employer's Representative or Inspector of Explosives shall have the power to prohibit the use of explosives in cases where in his opinion, the risks of injury to persons or damage to property or adjoining structures or services are too high. Such action by the Employer's Representative shall not entitle the Contractor to any additional payment for having to resort to other less economical methods of construction unless otherwise provided in the Special Conditions or Bill of Quantities.
- b) Should blasting be necessary, the Contractor shall take every precaution to protect the Works, persons, animals and property in the vicinity of the site. The Contractor shall be held responsible for any injury or damage caused by any blasting operations and shall make good such damage at his own expense.
- c) The latest requirements of the Explosives Regulations Act (Act 26 of 1956) and the requirements of the Inspector of Explosives shall be complied with. In addition, where applicable, the requirements of Chapter 9 of the Regulations published in terms of the Mines and Works Act (Act 27 of 1956) and the requirements of the Government Mining Engineer shall be complied with. All explosives handling, storage and blasting operations to be in accordance OHS Act, Explosives Regulations, Government Gazette No. 2472
- d) A copy of each blasting permit issued to workmen, and of each permit issued to the Contractor to cover the purchase, storage and transport of explosives, shall be supplied to the Employer's Representative. The Contractor shall grant the Employer's Representative access to all records maintained for the Inspector of Explosives or the Government Mining Engineer, as the case may be.
- e) Blasting Near Dwellings/Installations/Services
  - i) Before any blasting is undertaken, the Contractor, together with the Employer's Representative, shall examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record, together with the owners thereof, the extent of any cracking or damage that may exist before commencement of blasting operations. It is recommended that a detailed photographic record of neighbouring structures be taken before blasting commences. It will be the responsibility of the Contractor to make good at his own expense any further damage to such houses, buildings or structures which is a result of the blasting.
  - ii) Where there is reasonable danger of damage (structural, electrical or mechanical) to adjacent reservoirs and associated structures, power and telephone lines, fuel pipelines, or any other property, the Contractor shall suitably adapt his methods of blasting, the size of charges, and use adequate protective measures to ensure that no damage occurs.
- f) The Contractor is to submit to the Employer's Representative for approval a professional report on the proposed method of blasting to be adopted for the works.
- g) During the initial blasting on site the Employer's Representative shall arrange for a survey to be carried out in order to monitor the magnitude of the blast vibrations and to establish the most vibration sensitive point on the perimeter of the site. Should it be required, the Contractor shall modify the adopted method of blasting as instructed by the Employer's Representative.
- h) For every blast carried out on site the Contractor shall provide three vibro recorders and a peak particle velocity meter. Calibration certificates are to be supplied to the

Employer's Representative prior to commencing blasting on site. The Employer's Representative shall arrange for random checking of the calibration of such instruments.

- i) The Contractor shall keep full records of every blast on site, e.g. number, depth and size of holes, amount and type of explosive used per hole, number of blasts at any one time, magnitude of recorded vibrations etc., a copy of which is to be forwarded to the Employer's Representative.
- j) All blast surfaces are to be covered with mats and/or a suitable thickness of soft cover material all to the satisfaction of the Employer's Representative.
- k) For every blast carried out on site, the Contractor shall cover the cordtex etc., with soft sandy material to dampen the noise levels of the blast all to the satisfaction of the Employer's Representative.
- l) The maximum allowable peak particle velocity measured at any point 10m from the nearest structure to the blast shall not exceed 25mm/sec. The fact that peak particle velocity has been stated in this clause does not mean that the Contractor should accept this as the minimum requirement at all times. Should circumstances require a reduced peak particle velocity from that stated above, to ensure a safe environment from blasting, the Contractor shall adjust his blasts according to requirements.
- m) When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any over break allowance specified in the Special Conditions or any other specification given on a drawing.

The Contractor shall include for all costs in complying with the above requirements/ conditions in the tendered rates for excavation.

Notwithstanding any of the requirements of the Specifications the Contractor will be required to carry out a sufficient number of test blasts (minimum 3), each comprising of a maximum number of 9 holes charged with small charges, in order to ascertain the attenuation affects of the in-situ material and to satisfy both himself and the Employer's Representative that the proposed methods of blasting will not damage any existing services and/or dwellings and structures.

All persons occupying property in the vicinity of a proposed blast shall be informed in writing at least 72 hours before the first blast and shall be informed of the warning procedures to be employed. In addition, before any blasting is carried out, the Contractor shall notify the local Police in writing of proposed operations, the warning procedures to be employed, and the anticipated duration of the blasting operations.

Immediately prior to blasting, all approaches to the area shall be guarded by personnel carrying red warning flags.

#### **PSD 5.1.1.5 Negligence**

Add new Sub-Clause:

The Contractor shall be liable for all damages to property or services caused as a result of blasting.

**PSD 5.1.3 Stormwater And Groundwater**

Delete the second sentence and substitute:

Foundation excavations for structures shall be kept free of water at all times until they have been inspected and approved and the concrete substructures, together with their related superstructures, have been completed.

**PSD 5.2 METHODS AND PROCEDURES**

The plant used for applying the dynamic load, controlling the moisture content and grading or mixing shall be capable of achieving the compaction specified using the materials available for the construction of the Works.

**PSD 5.2.1 Site Preparation****PSD 5.2.1.1 Clearing of and stripping of site**

Delete the last sentence of (b) and substitute:

“Material so removed shall be disposed of by the Contractor to approved sites in terms of the Environmental Management Plan”.

**PSD 5.2.1.2 Conservation of Topsoil**

Add to the Sub-Clause:

All topsoil suitable for re-use shall be transported directly to the stockpile area and placed separately from all other materials in order to avoid contamination. All stockpiles are to be managed in terms of acceptable environmental management practises.

**PSD 5.2.2 Excavation****PSD 5.2.2.1 Excavation for General Earthworks and Structures**

Add to the Sub-Clause:

No concrete or other material shall be built or otherwise placed in the foundation pits until they have been cleaned, inspected and passed by the Employer's Representative. The bottom of the excavation must be compacted to at least 95% Mod. AASHTO density provided that the material in itself is capable of being so compacted and the excavation must be kept free of water at all times.

Where the material at the founding level is soft material, or hard material which deteriorates rapidly on exposure, excavation to final level shall not be made until just before the Contractor is ready to place the blinding layer.

Immediately after the material at founding level has been approved and before it is built upon, levels shall be taken and compared by the representatives of the Contractor and the Employer's Representative. Any disagreement is to be checked immediately while it is still possible to do so.

Excavated and stockpiled material shall be deposited so as not to endanger the uncompleted structure either by direct pressure or indirectly by overloading the banks adjacent to the structure or in any other way. The Contractor shall not spoil, waste or stockpile excavated material without the approval of the Employer's Representative.



Where outside shuttering is ordered by the Employer's Representative, the excavations shall be carried out for an extra width of not more than 500mm all around the structure, measured from the base of the face to be shuttered, to allow for working space for the shuttering to be fixed.

Payment for excavations shall be measured nett. Over break, or allowance by the Contractor for battered slopes, shall not be measured for payment purposes.

Outside shuttering shall be used for the construction of all major structures unless ordered otherwise by the Employer's Representative.

Where permanent concrete is to be placed against an excavated face, the excavation shall be trimmed to ensure that there is no projection greater than 10mm protruding into the excavation profile.

Material for earthworks shall be obtained from borrow pits only on instructions from the Employer's Representative. In order to avoid the necessity to dispose of surplus material, every endeavour must be made to use the in-situ material in cuttings as earthworks fill material and even as lower selected material where suitable.

#### **PSD 5.2.2.5 Benching**

Add new Sub-Clause:

The requirements of Sub-Clause 5.2.4.1 (b) of SABS 1200 DM shall apply.

#### **PSD 5.2.3 Placing And Compaction**

##### **PSD 5.2.3.1 Embankments**

Delete the word "90%" and replace with "93%"

Add the following:

Before any placing of fill commences, preparatory work such as site clearing, fencing (where required), and the removal of topsoil and unsuitable ground shall be completed. All drainage structures and culverts shall also be installed unless agreed otherwise by the Employer's Representative. Where the height of fill is 1,0m or less, the natural ground shall be compacted to 95% Mod. A.A.S.H.T.O., before filling commences and where the fill height is greater than 1m compaction shall be to 95% Mod. AASHTO to a depth of at least 150mm in both cases.

##### **Bonding**

- If the natural ground crossfall is greater than 5% the entire interface between the embankment and the natural ground shall be bonded by scarifying to a depth of 150mm.
- The thickness of any one layer of fill up to 1m below formation level shall not exceed 150mm after compaction using static rollers, or 300mm using vibrating rollers.
- The top 1m layer of fill below formation shall be carried out in layers not exceeding 150mm thickness.

The standard of compaction required shall be-

- up to 1m below formation level, 95% Mod. AASHTO. density;



- the top 1m layer below formation, 95% Mod. AASHTO density.
- The moisture content during compaction of the top 1m layer below formation as determined by the Modified AASHTO compaction test shall be optimum +/- 2%.
- After compaction, the layer shall be proof-rolled with a vehicle having a minimum wheel load of 20 kN in order to determine any soft spots.
- Any layer which becomes soft after being compacted and tested, shall be recompacted to the specified density at the Contractor's expense.
- All stones, lumps, etc. shall be broken down to conform to a maximum dimension not exceeding two-thirds of the specified compacted thickness of the layer.
- Placing of Fill on Swampy Ground – On swampy ground and at other problem areas but not around structures, the Employer's Representative may permit the pioneering of the embankment by end dumping or bulldozing, but only to the minimum extent necessary to develop adequate facilities for normal placing.
- The side slopes shall be trimmed to a plane surface free from loose material and stones larger than 100mm maximum dimension and having no local humps or depressions greater than 150mm. Where the embankment slope is not to receive topsoil, it shall be compacted to provide a stable slope. Where the surface is to receive topsoil it shall be left with a semi-rough finish free from loose material.

Item coverage shall include for: -

- Compacting of natural ground before forming embankments to 95% Mod. AASHTO. to a depth of at least 150mm; and
- Allowing for shrinkage and wastage of material.

### **PSD 5.2.3.2 Backfilling of Trenches and Backfilling or Filling against Structures**

Add the following:

Excavated material containing little or no organic matter, large clay lumps and excluding stones of average dimension exceeding 200mm may be used for backfill. Suitable material arising from excavations for structures, foundations, footings and the like which is suitable for backfilling shall be stockpiled whilst all other materials from excavations shall be disposed of offsite. Backfill to structures and that used in the formation of embankments shall be compacted to 95% modified AASHTO density respectively.

Where rock is incorporated into the backfill material, the use of rockfill techniques will be required for the formation of embankments. The techniques include the use of heavy grid or padfoot rollers and flooding of the fill to achieve compaction. Portion of the rock may be blended with the softer surface materials, which could be set aside for this purpose. All costs which may arise as a result of these requirements are to be included in the rates.

Contractors are to note that no overhaul of backfill material will be measured and backfill quantities will only be measured up to the pay lines as indicated on the drawings. The Contractor shall be responsible for backfilling any working space and excavation slopes, over breaking, battering etc., beyond the indicated pay lines.

Backfilling around concrete structures shall only begin once the concrete has attained the specified strength i.e. after a minimum 28 days. No backfilling against water retaining structures shall take place before completion of water tightness test.

**PSD 5.2.4.2 Topsoiling**

Delete the last sentence and replace with:

The final thickness of topsoil after compaction shall be 150mm

**PSD 5.2.4.3 Grass and other vegetation**

Add to the Sub-Clause:

The topsoil surface of embankments, terraces and other designated areas are to be planted or seeded in accordance with the Environmental Specification and environmental rehabilitation plan, if applicable.

The Contractor shall schedule his planting and sowing in order for this activity to fall within suitable seasonal times in order to ensure adequate and acceptable strike rate.

Newly planted vegetation shall be maintained for a minimum of 3 months to ensure strike rate and growth, however, should vegetation be planted during un seasonal times, maintenance shall continue to ensure growth as required, once the season has turned to conducive growth conditions.

**PSD 5.2.5 Transport For Earthworks****PSD 5.2.5.1 Freehaul**

Replace Clause D 5.2.5.1 with the following: -

The freehaul distance for this contract is unlimited. Contractors are to note that **no** overhaul will be paid.

**PSD 5.2.5.2 Overhaul**

Delete Sub-Clause and replace with:

All transportation of all excavated material shall be regarded as free haul and **no** overhaul shall be applicable.

**PSD 6 TOLERANCES**

Add the following to D 6:

The allowable tolerances shall be-

- a) the design angle  $\pm 2$  degrees for the angle of the cut or fill slope;
- b) not less than the design width for the transverse horizontal embankment width at any level; and
- c) the layer thickness  $\pm 20$ mm for topsoil;

For the formation, the Contractor will be required to place level pegs longitudinally at 5m intervals on a road construction contract and elevation tolerances shall be taken on a section of the works. (When portion of the works is less than 500m<sup>2</sup> one tolerance reading per 10m<sup>2</sup> shall be taken).

In any section the average of the elevations taken shall be such that the average thickness of the succeeding layer or layers above the formation shall be not less than that specified/nor greater than that specified plus 20mm.

The standard deviation of the differences between the actual and design levels shall not be greater than 10mm.

### **PSD 6.3 EXCAVATION BY MECHANICAL MEANS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Where bulk excavation is carried out by earth moving equipment, such excavation will only be allowed to within a level of 300mm, or less as ordered by the Employer's Representative, above the general level to which the ground has to be reduced, the balance of the bulk excavation being carried out by hand or by other means approved by the Employer's Representative.

## **PSD 7 TESTING**

### **PSD 7.2 TAKING AND TESTING OF SAMPLES (NEW SUB-CLAUSE)**

Add to the Sub-Clause:

Determination of the standard of compaction achieved shall be carried out in accordance with Standard methods of testing road construction materials published by the Department of Transport Division of National Roads, Publication TMH 1.

The cost of all control testing is covered under the Preliminary and General section of the Schedule of Quantities.

## **PSD 8 MEASUREMENT AND PAYMENT**

### **PSD 8.1 BASIC PRINCIPLES**

Add the following to D 8.1.1:

Items coverage shall include for-

- 1) Loosening or breaking up unexcavated material before or during excavation.
- 2) Allowing for bulking or shrinkage of material before or during excavation.
- 3) Blasting where required.
- 4) Keeping the earthworks free of water.
- 5) Depositing fill to slope away from vertical drainage layers and providing temporary drainage to prevent surface water from entering such drainage layers.
- 6) Forming and trimming the slopes.
- 7) Restrictions on working at sides of structures.
- 8) Taking precautions to avoid damage to structure, existing sewers, drains and services, including providing temporary supports.
- 9) The drying of material which cannot be placed immediately in the fill embankments as its in-situ moisture content exceeds the limits specified.
- 10) Selecting suitable material of stated types and layering or depositing in locations indicated by the Employer's Representative or in stockpiles.

## PSD 8.2 COMPUTATION OF QUANTITIES

Add the following to D 8.2.1.

No allowance will be made for bulking or shrinkage and excavation will be paid as being the volume in place before excavation commenced.

Add the following to D 8.2.3:

Prior to commencement of any excavation, the contractor shall notify the Employer's Representative in good time to ensure that measurements, cross-section, levels of the undisturbed ground, or any other relevant information are taken in order that the excavation quantities can be agreed upon between the Employer's Representative and the Contractor.

Where the Contractor submits survey data this is to be in a continuous ASCII file (csv and LandXML) with a format of each line as name, x, y, z.

The codes used to describe the survey points are to be agreed with the Employer's Representative and to be maintained throughout the Contract.

Handwritten notes or printouts on paper will not be accepted.

The Contractor is to ensure that his appointed surveyor is issued with these details prior to any survey work taking place.

Should the information not be received in either of the specified formats, the data may be deemed to be invalid by the Employer's Representative.

## PSD 8.3 SCHEDULED ITEMS

### PSD 8.3.2 Bulk Excavation

#### PSD 8.3.2(a) Excavate in all materials and use for embankment or backfill or dispose of as ordered

Add "including benching, if applicable" after the words "in addition to the cost of excavation "

In the second and last lines delete "Drawing D-1" and substitute "Fig D-1"

#### PSD 8.3.3(a) Restricted Excavation

Delete from "The rate..... fully specified in 5.2.2.1-5.2.2.3 (inclusive) and 5.2.3" in clause 8.3.3(a) and add the following:

The rate shall cover the cost of complying with the precautions required in terms of PSD 5.1 in addition to the cost of excavation, including benching (if applicable), basic selection, loading, transporting, offloading, stockpiling, re-loading, spreading of backfilling, watering, compacting, final grading, complying with the requirements for tolerances, providing for testing, and disposal of spoil, all in accordance with the requirements of the specification.

In the heading delete "Drawing D-2" and substitute "Fig D-2"

**PSD 8.3.4 Importing Of Materials**

Add the following to D 8.3.4:

The measured volume of imported fill shall be the difference between the net volume of compacted fill and the net volume of suitable material excavated from the site and actually used as compacted fill. For this purpose, it shall be taken that one cubic metre of suitable material excavated from within the site forms one cubic metre of compacted fill.

**PSD 8.3.4.1 From Stockpile**

The rate shall cover the cost of obtaining selected backfill or fill material from stockpile, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.4.2 From Other Excavations on Site**

The rate shall cover the cost of obtaining selected backfill or fill material from other excavations on site, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.4.3 From Commercial Sources**

The rate shall cover the cost of acquiring suitable material, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.5 Working Space**

Add the following to D 8.3.5:

**PSD 8.3.5.1 Bulk Excavation**

The rates for bulk earthworks will be inclusive of materials up to the payline as shown in the drawings. Any additional excavation required is to be included in the tendered rates.

**PSD 8.3.5.2 Restricted Excavation**

The rates for restricted excavation will include for any required allowance for working space. The volume of restricted excavation will be based on the plan area of the structure or item multiplied by the depth measured from the original ground level or a particular datum level agreed prior to commencing excavation.

**PSD 8.3.6 Overhaul**

Delete item (a)  
Delete item (b):

Add to Clause:

**No** overhaul payment will be applicable.

**PSD 8.3.7 Additional Lateral Support**

Replace D 8.3.7 with the following:

In compliance with clause D5.1.2, the tendered rate for Excavation and Backfilling shall include for the provision of temporary lateral support where this is required.

This item will not be considered for use by the Contractor for general shoring required to facilitate trench stability in terms of the relevant safety legislation.

All temporary works to be carried out in accordance with the Occupational Health & Safety Act, 1993 (Act 85 of 1993): Construction Regulations 2014 and applicable sections of SABS 1200. The design of any temporary works including shoring shall be carried out by a registered professional engineer.

The sum will be an amount to cover the direct extra cost of all operations required of the Contractor to provide the additional lateral support as ordered and the cost of delays and disruption as agreed with the Employer's Representative.

**PSD 8.3.11 Grass And Other Vegetation**

Add to the Sub-Clause:

The rate shall cover the cost planting sods on embankments and/ or terraces and seeding of other designated flat areas inclusive of fertilising, watering until the area is fully covered with grass and maintenance by the Contractor for a minimum period of three months, during suitable seasonal times. This will include watering and weeding of the planted areas as per Clause PSD to the satisfaction of the Employer's Representative and the costs of complying with this requirement are to be included in the rates for grass planting. Should vegetation be planted during unseasonal times, maintenance shall continue to ensure growth as required, once the season has turned to conducive growth conditions.

**PSD 8.3.14 Top soiling From Commercial Sources**

Add new Sub-Clause:

The rate shall cover the cost of procuring the topsoil from commercial source, transporting, and spreading in terms of 5.2.4.2 where no topsoil is available from stockpiles.

**PSD 8.3.15 Trimming Of Embankments - Machine Trimming**

Add new Sub-Clause:

The unit of measurement shall be the metre (m<sup>2</sup>)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Representative. Measurements shall be in square metres (m<sup>2</sup>) measured along the shape of the embankment.

#### **PSD 8.3.16 Trimming Of Embankments - Hand Trimming**

Add new Sub-Clause:

The unit of measurement shall be the metre (m<sup>2</sup>)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Representative. Measurements shall be in square metres (m<sup>2</sup>) measured along the shape of the embankment.

#### **PSD 8.3.17 Barricading (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be the metre (m) for any of the type of barricading or fencing specified under PSD 5.1.1.1 – Barricading and lighting

The quantity for these items will always be reflected as provisional quantities.

Barricading will be measured as inclusive of both sides of the working corridor by the total linear length in metres, parallel to excavations and sundry structures or where to be erected as instructed by the Employer's Representative. The materials for each barricade type may be re-used as the working front progresses and the tendered rates shall include for manufacturing, delivering to site, erection, maintenance, provision of access points as well as closing off at ends of work fronts as well as dismantling and re-erection at different locations as and where required.

Barricading material shall be functional at all times and shall be replaced when such functionality is not to the satisfaction of the Employer's Representative.

The rate for Armco type barriers shall be deemed to include for the reinstatement of the paved road surface in terms of PSD 5.1.1.1- Item 5

#### **PSD 8.3.18 Survey Of Surrounding Structures Before Blasting (New Sub-Clause)**

Add new Sub-Clause:

The rate for Extra Over for excavation in rock shall cover the cost to examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record together with the owners thereof the extent of cracking or damage that may exist before commencement of blasting operations.

#### **PSD 8.3.19 Photographic Record (New Sub-Clause)**

Add new Sub-Clause:

The rate for Extra Over for excavation in rock shall cover the cost of providing a photographic record of neighbouring structures before blasting commences.

**PSD 8.3.20 TOPSOILING**

The unit of measurement shall be square metre (m<sup>2</sup>).

Add new Sub Clause:

The rate shall cover the cost of excavating from stockpiles, hauling, spreading and ripping of the top 400mm layer of topsoil to enhance establishment of new plants.

The tendered rate shall include for full compensation for plant, materials, fuel and labour necessary to ensure ripping of compacted tracks to a maximum depth of 400 mm.

**PSD 8.3.21 BERMS**

The unit of measurement shall be metre (m).

Add new Sub Clause:

The following conditions apply to contour/diversion berms

- Berms shall be constructed in such a manner to ensure that water is diverted to a less erodible location.
- Berms shall be at least 500mm high (+- Variance of 10mm) at its highest point relative to the surrounding soil.
- Contour berms shall be at least 300mm (+- Variance of 10mm) deep to the lowest point relative to the surrounding soil.
- Contour berms shall be adequately compacted to avoid erosion.
- Contour berms shall be constructed with the installation of a geosynthetic liner such as "Kaytech Soilsaver 292" or similar approved product where required. The Employer's Agent will instruct on requirements, based on local conditions when finishing off the work.
- Contour berm exit points shall be fitted with the installation of "Kaytech Grassfence" (or similar approved product) across the width of the berm at the exit point, splayed at 30 degrees towards the slope upper side with the curtain embedded into the berm invert by at least 75mm.
- All geofabrics used must be anchored in the invert.
- Contour berms shall be approximately 1000mm wide.



**PSDB EARTHWORKS (PIPE TRENCHES) (SABS 1200 DB – 1989)****PSDB 3 MATERIALS****PSDB 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES**

Amend this clause to read similar to that described under clause PSD 3.1 of the Variations and Additions to the Standardised Specification for Earthworks (SABS 1200 D – 1988)

**PSDB 3.3 SELECTED GRANULAR MATERIAL**

Delete Sub-Clause and replace with:

See Clause PSLB 3.1

**PSDB 3.4 SELECTED FILL MATERIAL**

Delete Sub-Clause and replace with:

See Clause PSLB 3.2

**PSDB 3.5 BACKFILL MATERIAL**

(a) In the third line delete “150mm” and substitute “100mm”.

(b) In the second line delete “P.I not exceeding 12” and substitute “P.I not exceeding 6”.

**PSDB 3.7 SELECTION**

Add the following to DB 3.7:

Contractors are advised that the stockpiling of excavated material suitable for use as backfilling, will be permitted alongside trench excavations where possible. All other excavated material unsuitable for re-use, either as backfill or for the formation of embankments shall be disposed of at the spoil site. No overhaul will be paid.

**PSDB 5 CONSTRUCTION****PSDB 5.1 PRECAUTIONS****PSDB 5.1.2.2 Special water hazards**

Add to the Sub-Clause:

The Engineer may direct the Contractor to implement subsoil drainage measures at certain sections of the pipe trench where ground water seepage is considered significant. Such drainage measures shall consist of a free draining granular material such as 25mm crushed stone wrapped in porous geo-membrane placed underneath and/or alongside the pipe and/or in separate drainage trenches from where a suitably sized pipe, as directed by the Engineer, will lead the collected water away from the pipeline trenches.

This work shall be undertaken as per the relevant detail drawing as instructed on site by the Engineer.

### PSDB 5.1.2.3 Sloping ground

Delete the Sub-Clause and replace with:

The Contractor shall be responsible throughout the duration of the Contract, inclusive of the Defects Liability Period, for the provision of all soil erosion preventative measures necessary to protect the trenches, pipeline(s), road works, reinstated work and land utilised by the Contractor during the Contract, from any adverse effects of soil erosion, settlement, scour, etc, resulting from the construction of the works. The Contractor shall deploy whatever systems needed in order to give effect to this requirement.

Once reinstatements have been completed along sections not in a road reserve, contour/diversion berms, generally extending across the full width of the working corridor, consisting of low earth mounds shaped to rounded form and so oriented as to have a fall of 1% along their length, in general terms, shall be constructed with compacted non erodible material having a minimum density of 90% modified AASHTO density and minimum dimensions and maximum spacings dependent on the slope of the ground along the length of the pipeline.

The height of the contour/diversion berms for a distance of 1 metre on either side of the trench centreline shall be raised 150 mm above the remainder of the cross-embankment to allow for settlement. In order to form a satisfactory drainage channel upstream of each cross-embankment (at a slope of 1%) the crown over the backfilled trench shall be removed for a distance of 0,5 m upstream of the cross-embankment.

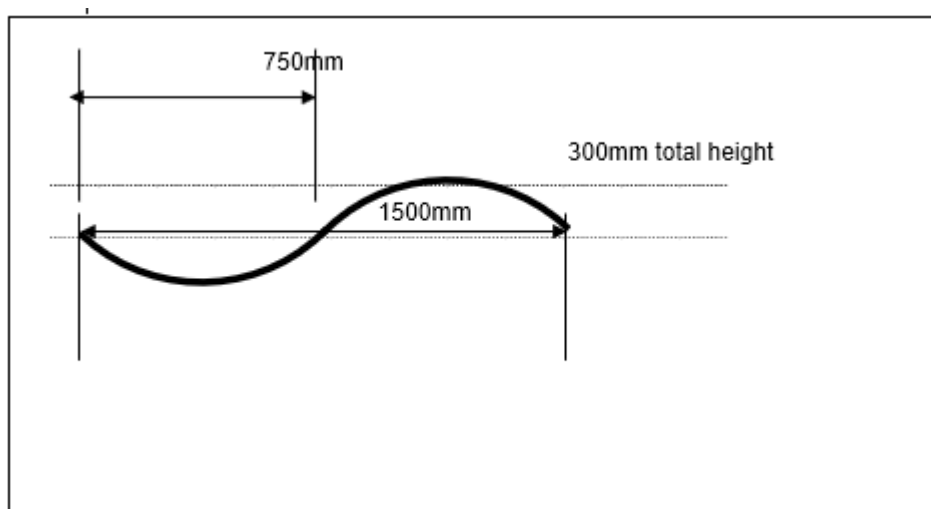
Contour/diversion berms shall be constructed to the same minimum standards and dimensions indicated wherever artificial slopes have been formed in the working corridor, or other areas used during construction and with the approval of the Engineer, are permitted to be left as is.

The following general conditions apply to contour/diversion berms

- Contour berms shall be constructed on slopes with gradients of between 1:100 and 1:1 (Slope Categories 1, 2 and 3), upon instruction by the Engineer.
- Contour berms shall be constructed as per cross section detail A noted below.
- Where contour berms are constructed on soils with a high (>35% clay) content the gradient of the canal at the base of the up-slope side of the bank shall be 1:100 and on loam soils (35 – 15% clay) the gradient of the canal shall be 1:200.
- Where the construction corridor runs primarily across the contours the contour berm shall extend across the entire width of the cleared corridor and the discharge end of the contour berm must, where possible, extend into adjacent vegetation for a distance of 3.0 metres.
- Where the construction corridor runs more or less parallel to the contours contour berms may not exceed 300m in length without provision being made for captured runoff to exit the berm.
- Where a berm which is parallel to the contour is constructed, and is less than 150m long, the gradient for the runoff canal should be 2% on soils with high clay content and 1.5% on loam soils. Where a berm which is parallel to the contour is constructed and is between 150m and 300m long the gradient for the runoff canal for both clay and loam soils must be 1%.
- Ideally, water discharged from the end(s) of such berms should be into a natural watercourse which does not display signs of accelerated erosion within a distance of 500m from the downside of the corridor.

- In the event that a natural watercourse does display signs of accelerated erosion within 500m of the downside of the corridor, measures, such as installation of a suitable geotextiles, or structures such as a reno mattress, must be put in place before runoff associated with the corridor is discharged into it.
- Contour berms shall be constructed in such a manner to ensure that water is diverted to a less erodible location.
- Contour berms shall be at least 300mm high (+- Variance of 10mm) at its highest point relative to the surrounding soil.
- Contour berms shall be at least 300mm (+- Variance of 10mm) deep to the lowest point relative to the surrounding soil.
- Contour berms shall be adequately compacted to avoid erosion.
- Contour berms shall be constructed with the installation of a geosynthetic liner such as “Kaytech Soilsaver 292” or similar approved product where required. The Engineer will instruct on requirements, based on local conditions when finishing off the work.
- Contour berm exit points shall be fitted with the installation of “Kaytech Grassfence” (or similar approved product) across the width of the berm at the exit point, splayed at 30 degrees towards the slope upper side with the curtain embedded into the berm invert by at least 75mm.
- All geofabrics used must be anchored in the invert.
- Contour berms shall be constructed at vertical intervals determined by slope gradient as identified in the table below:

Detail A - Berm Shape Cross Section



The following table specifies the **vertical** interval between contour berms which must be constructed on slopes of different steepness. Note that on slopes of 1:5 and steeper contour berms are to be used together with geotextiles to reduce soil loss and slope failure.

Table Vertical intervals (metres) for soils with moderate potential risk of eroding in areas experiencing a mean annual rainfall of 750-800mm and greater

Vertical intervals (m) for soil with medium erodibility potential	Land Slope (%)	2	3	4	5	6	7	8	9	10	11	12
	Vertical intervals (m)	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8

### Geofabric Products

Only geotextile material which is supplied by a company which provides on-site training on how their product(s) should be installed may be used.

The Contractor shall provide written confirmation to the Engineer of the staff who have attended the Supplier's onsite training courses on how their product(s) should be installed.

#### **Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product**

- Will be utilized on slopes with a gradient of 1:5 and steeper up to, but not exceeding 1:2.(Slope Category 2)
- Will be installed in consultation and in accordance with the manufacturer's specifications.

#### **Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product**

- Will be utilized on slopes with a gradient of 1:2 and steeper up to, but not exceeding 1:1.(Slope Category 3)
- Shall be installed in consultation and in accordance with the manufacturer's specifications.

#### **Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product**

- Will be utilized, upon instruction from the Engineer, on slopes of 1:1 and steeper (Slope Category 4) depending upon soil conditions.
- Will be installed in consultation with the supplier and in accordance with the manufacturer's specifications.

#### **Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product**

- Will be utilized, upon the instruction of the Engineer, on slopes of 1:1 and steeper (Slope Category 4) up to near vertical faces.
- Will be installed in consultation and in accordance with the manufacturer's specifications.

### **PSDB 5.1.2.4 Cross walls in trenches (New sub-clause)**

Add new Sub-Clause:

Where indicated on the drawings or as instructed by the Engineer, the Contractor shall construct cross walls in the trench on steep sections of the pipeline to prevent bedding from becoming a drainage path for ground water.

**PSDB 5.1.4 Existing Services That Intersect Or Adjoin Trenches**

The requirements of PSD 5.1.2 and the relevant Project Specification clauses are applicable.

**PSDB 5.2 MINIMUM BASE WIDTHS**

In the 3<sup>rd</sup> and 5<sup>th</sup> line, delete the word “External” and replace with “Nominal.” Delete the table and replace with the following table:

Nominal Diameter of Pipe Barrel		Side Allowance on each side (mm)
Over	Up to and Including	
-	DN 125	300
DN 125	DN 500	300
DN 500	DN 1 000	600
DN 1 000	-	600

Add to the Sub-Clause:

A greater base width may be allowed at the discretion of the Employer's Representative, provided that the Contractor proves to the Employer's Representative that the working space allowed by this Sub-clause is insufficient to carry out his pipe laying and backfilling activities in accordance with the specification. The tendered rates for excavation of pipe trenches shall be deemed to include for a greater base width as specified in this clause, should the Contractor wish to use a greater base width than that indicated.

Trench sides shall be as near vertical as possible in order to minimise the quantity of backfill material required and to avoid possible difficulties where pipelines have to be installed parallel to existing services, fences, hedges, etc and to minimise the loading on the pipe.

The tendered rate for the excavation for pipe trenches shall include for the excavation of bell/ fox holes at pipe joints and/or segmented bends.

**PSDB 5.4 EXCAVATION**

Add to the Sub-Clause:

The length of pipe trench excavation for the laying of the water pipeline, shall be limited in terms of the relevant Project Specification Clauses.

Where the pipe trench crosses surfaced roads the Contractor shall neatly cut two parallel grooves into and through the surfacing before excavating between the grooves. The grooves are to be set back at least 200mm from the edge of the excavation face to prevent ravelling of the cut edge. The cost of this operation, shall be deemed to be included in the tendered rates for pipe trench excavation.

The precautions for excavations as specified in Clause 5.1.1 of Section SABS 1200 D, 1200 DA and the relevant clauses in PSD and PSDA shall also apply to all trench excavations.

The Contractor shall take all the steps necessary to ensure that no person is required or allowed to work in a trench or any other unsupported overhanging excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported, shored or braced if there is any danger whatsoever of the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the

Contractor, shall be strong and sturdy enough to support the sides of the excavation in question. Should conditions on site require support, shoring or bracing at depths shallower than 1.5m, then the required safety measures shall be implemented.

Where a stormwater or sewer pipe crosses a road in fill or an area to be filled, trench excavation shall take place before the road or area is filled. The Works shall be measured as per item 8.3.2 and PSBD 8.1.2 (c).

Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

#### General

- a) Excavation shall be undertaken in whatever material is encountered and to such levels and widths as are indicated on the drawings, in the specification and as instructed by the Engineer. Trench excavation shall be undertaken in narrow trenching conditions with vertical sides necessitating the use of shoring and open battered trench excavation will not be permitted unless otherwise stated in Project Specification.
- b) Control of the dimensions of the excavations shall be by means of boning rods and sight rails, an acceptable base beam device or other approved method. If the first method is used the Contractor shall erect sight rails over the centre of each manhole or vertical bend and along the length of the excavation with a maximum distance of 30m apart and with a minimum number of 3 for any one length of excavation being undertaken. The centre line of the pipeline shall be denoted on each sight rail both back and front by a single vertical line and either side of the centre line painted with contrasting colours.
- c) The Contractor shall place a reference peg alongside each sight rail, take the levels and give their values to the Engineer.
- d) Should the Contractor excavate to a greater depth than specified he shall, at his own expense, replace the excess material so removed with selected fill compacted to 93% Mod. AASHTO density, or grade 10/26 concrete if the use of selected fill is not practical.
- e) Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

#### **PSDB 5.4.1 Open Trench Limits (New Sub-Clause)**

Add new Sub-clause:

The open trench limits are governed by the relevant Project Specification clauses.. All aspects of lengths of work fronts as specified in this clause shall be enforced at all times.

**PSDB 5.5 TRENCH BOTTOM**

Replace “90% “with “93%“.

Add to the Sub-Clause:

Should any portion of a pipe trench exceed the specified depth, the Contractor shall be held responsible for any additional costs which may arise as a result of such over-excavation. Where the Contractor has over excavated the depth of the trench, the Contractor shall at his own expense replace the excess material so removed with suitable fill material compacted to 93% MAASHTO density or with 10Mpa concrete, as directed by the Employer's Representative.

Where unsuitable soft, wet material occurs on the trench bottom, the Employer's Representative may instruct the Contractor to remove such material and replace with other granular material selected from the site or imported. This material will be used to make up the soft material removed, up to the level of the bottom of trench. Upon instruction by the Employer's Representative, selected rock fill will be required to make good the unsuitable soft material. The surface of this selected rock fill (as instructed by the Employer's Representative) shall be levelled off using pipe cradle material or stone bedding. Should such selected rock fill not be available, the Employer's Representative will instruct the Contractor to use clean, free draining granular material.

For welded steel pipes, the trench shall be widened and deepened over a suitable length at the joints on each side of and beneath the pipe to allow working space for the jointing. This additional excavation is to be included in the tendered rates for trench excavation.

**PSDB 5.6 BACKFILLING****PSDB 5.6.1 General**

Add to the Sub-Clause:

Notwithstanding the requirements of Sub-Clauses 5.6.1 and 5.6.6, no pipe joint or pipe fitting shall be covered by either blanket or backfill material prior to the successful completion of the necessary tests on the welded joints, the hydraulic pressure test of the pipeline and on the joint wrapping at such joints.

**PSDB 5.6.2 Material For Backfilling**

Delete second paragraph and substitute the following:

Hard rock material shall not be used for, or incorporated into, the backfill above the blanket layers without the Employer's Representative approval.

**PSDB 5.6.3 Disposal Of Soft Excavation Material**

Add the following:

Material which the Employer's Representative considers to be unsuitable for the bottom of the trench shall be excavated to depths as instructed and disposed of as surplus material. The resultant space shall be refilled, as ordered, with approved material and compacted to a 93% Mod. AASHTO density.

**PSDB 5.6.4 Disposal Of Intermediate And Hard Rock Material**

Delete the Sub-Clause and add the following:

Surplus intermediate and hard rock material from trench excavations shall be disposed of offsite to an approved spoil disposal site.

**PSDB 5.7 COMPACTION**

Add to the Sub-Clause:

The Contractor shall make provision in his rates for compaction of trench backfill and compaction where such backfill to be compacted has to be with suitable equipment and machinery, small enough to fit into trench dimensions. The Contractor cannot assume the use of large road works machinery for the purpose of trench backfill and compaction where not suitable. All tendered rates shall be deemed to include for the compaction under restricted trench widths where required.

**PSDB 5.7.1 Areas Not Subject To Traffic Loads**

In the second line, delete 300 mm and replace with 150 mm.

In the third line, replace the words 90% of modified AASHTO with 95% of modified AASHTO.

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe.

The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.

**PSDB 5.7.2 Areas Subject To Traffic Loads**

In the third line, replace the words 93% of modified AASHTO with 97% of modified AASHTO and replace the words 95% of modified AASHTO with 98% of modified AASHTO.

Add to the end of the sentence:

... for an extent of 2m on either side of the carriage way at each crossing.

Add to Sub-Clause:

All backfill to pipes under roads and in road reserves shall comply with the requirements of sub-clause 3.5(b) and shall be compacted in accordance with Sub-Clause PSDB 5.7.2

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe. The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.



**PSDB 5.9 REINSTATEMENT OF SURFACES****PSDB 5.9.4 Bitumen Roads, Sub Base And Base**

Add to Sub-Clause:

The Contractor shall include in his tendered rates for the reinstatement of all surfaces and including for all layerworks, to their conditions prevailing before the commencement of construction.

Items have been included in the Bill of Quantities to price for the reinstatement of certain surfaces (concrete and/or asphalted/gravel driveways and/or roads) and for payment purposes, the area of those specific surfaces shall be calculated from the product of the length of the trench and the specified trench width plus 400mm (refer PSDB 5.4).

**PSDB 5.11 TRENCH WALL STABILITY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Notwithstanding the requirements of PSDB 5.4.1, the Contractor shall take responsibility for the length of trench open at any time and if collapse of the side walls occurs for any reason, the responsibility will be the Contractors and he will reinstate and make good at his own cost.

**PSDB 5.12 SAFETY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The Contractor shall comply with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) when conducting trench excavations.

In terms of Sub-Clause 5.3 of SABS 1200A, the Contractor is responsible for providing shoring where necessary.

The Contractor shall meet his obligations for shoring of trenches in terms of legislative requirements, under all circumstances.

**PSDB 5.13 JOINTING HOLES (FOX HOLES) (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Jointing holes for pipes, also defined as Fox Holes in this specification, shall be formed of sufficient length and depth to allow working space for the proper jointing and wrapping of the pipe joints, pipe specials and other fittings which require wrapping.

After the pipe work has been inspected, tested, hydraulically tested and approved by the Employer's Representative, the jointing holes shall be backfilled and compacted to the same specification as that of the bedding material and compaction of trenches as specified under Clauses PSLB 3.

No additional payment will be made for forming and backfilling of fox holes, the cost of which is deemed to be included in the tendered rates for the excavation of pipe trenches.

**PSDB 7 TESTING**

Add the following:

The Contractor shall maintain accurate and up to date records of all materials, processes, process parameters and measurements necessary to ensure compliance with this specification. The format of the data to comply with the requirements as specified under the section dealing with the construction dossier.

The Contractor's quality control records shall be available for inspection at all times. Copies of these records shall be made available on request.

The contractor shall carry out process control checks on the compaction of the backfill of all trenches.

The Employer's Representative may appoint a 3<sup>rd</sup> party inspection authority to carry out quality surveillance on its behalf. The Contractor shall provide all facilities and access to works at all reasonable times as may be necessary for the independent body to carry out its function.

Quality surveillance will be undertaken by the Employer's Representative:

- a) when requested by the Contractor
- b) at the discretion of the Employer's Representative

Advance notice of a minimum of 8 normal working hours shall be given by the Contractor to the Employer's Representative when requesting inspection of any portion of the works.

Notwithstanding any surveillance carried out by the Employer's Representative, the Contractor shall retain full responsibility for the quality of all trench compaction carried out under the contract.

The cost of all control testing by an independent 3<sup>rd</sup> party inspection authority is covered under the Preliminary and General section of the Schedule of Quantities.

Density readings will be taken at random over the layer. The layer is acceptable should the Quality Surveillance fulfil the following requirements:

$$X \geq A \% + 0,5S$$

where :

X = Arithmetic mean of density readings for the layer.

A = Percentage Mod. AASHTO as defined in the specification for the layer.

S = Standard deviation.

The compaction control testing shall be carried out by the Contractor.

Density

Position	Roadways, Sidewalks	Other Locations
Trench formation	1 No. per 30 linear m	1 No. per 100 linear m
Bedding Cradle & Selected Fill Blanket	2 No. per 30 linear m	1 No. per 100 linear m per layer

Backfill	1 No. per layer per 15m <sup>2</sup> or part hereof	1 No. per 2 layers per 50m <sup>2</sup> or part hereof
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If the results of such density tests (which shall not be taken on the bedding material directly above the pipe) show that the material has been compacted to a density equal to or in excess of the applicable specified value (refer to Clause 5.7), the compaction will be accepted. If the density is found to be below the specified value, the Employer's Representative may order the re compaction and retesting of the backfill at the Contractor's expense.

The cost of testing shall be deemed to be included in the rates for excavation.

## **PSDB 8 MEASUREMENT AND PAYMENT**

### **PSDB 8.2 COMPUTATION OF QUANTITIES**

#### **PSDB 8.2.4 Shoring**

Add to sub-clause:

Except where shoring is specifically ordered by the Employer's Representative, the cost of shoring used, as well as the cost of any additional excavations required to install the shoring, will be deemed to be included in the rates tendered for the excavations. All shoring costs to meet legislative requirements shall be for the account of the Contractor.

#### **PSDB 8.3.2 Excavation**

##### **PSDB 8.3.2 (a)**

Add the following to Sub-Clause

All trench excavation shall be restricted excavation within confined working widths. The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his excavation rate for every eventuality, covering restricted access, confined spaces, close proximity to houses, shoring, high traffic volumes, accommodating traffic, providing access for pedestrian users, working in road reserves of various widths, working in working corridors of restricted width, shoring and working in the vicinity of existing services.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other aspects that require consideration in order to excavate the pipe trench.

Excavation for cable ducts shall be measured under this clause.

##### **PSDB 8.3.2 (b)**

Add the following to Sub-Clause:

Unit of measurement shall be m<sup>3</sup>

- 1) Hand excavation and backfill where ordered by the Employer's Representative
  - a) Boulder Excavation Class A
  - b) Boulder Excavation Class B

- c) E/O for excavation at grades steeper than 1:3

Measurement of Extra Over will not apply to any length of trench in soft material more than 2m long. Surplus boulder material from trench excavation shall where applicable, be disposed of to the designated spoil areas.

### **PSDB 8.3.2 (c)**

Add the following sub-items in 8.3.2 after sub item 8.3.2(c):

Unit of measurement shall be m<sup>3</sup>

- 2) Excavate in all materials for stormwater inlet and outlet structures and for manholes, catchpits, valve chambers and the like, irrespective of depth and backfill around structures :

The unit of measurement shall be the cubic metre of material excavated, measured in place according to the authorised dimensions, and excluding the volume of material excavated and paid for under sub-item (a).

The tendered rate shall include for the costs of excavating in all materials, backfilling, compacting, trimming and tidying of the final surface around the structure, disposing of surplus and unsuitable materials within the freehaul distance and where applicable, selecting and keeping separate, excavated material suitable for use as backfill.

- 3) Excavate open drains in all materials

The tendered rates shall include full compensation for excavating in all materials within the dimensions specified or authorised by the Engineer and to the specified lines and profiles, for the disposal of surplus and unsuitable excavated material where applicable, and in the case of item (d), for backfilling with suitable approved material compacted to 93% of modified AASHTO density around the structures.

- 4) Extra-over sub-items 2 and 3 for excavating in:

- a) Intermediate material
- b) Hard rock material

Measurement and payment shall be in accordance with the provisions of 8.3.2(b) of SABS 1200D (as amended)."

### **PSDB 8.3.3 Excavation Ancillaries**

#### **PSDB 8.3.3.3 Compaction in Road Reserves**

Add to the Sub-Clause:

"In the case of gravel roads, determining the volume, the depth will be measured from the underside of the gravel wearing course to the top of the fill blanket, and in the case of bitumen roads, from the underside of the subbase to the top of the fill blanket".

The rest of the trench shall be backfilled as specified in Clauses 5.9.3, 5.9.4 and 5.9.5, as applicable.

**PSDB 8.3.4 Particular Items**

Add to Sub-Clause:

The unit rate for trench shoring to remain in the excavation shall include for-

the supply and placing of trench shoring and other support measures; maintenance; and additional costs for backfilling and compaction with trench supports left in trench.

**PSDB 8.3.5 Existing Services That Intersect Or Adjoin A Pipe Trench**

Under Item a) in the 5th line, delete the phrase "...whether or not their presence is known before they are uncovered..."

Add to the Sub-Clause:

(v) all work involved in locating the service by hand excavation;

(vi) notifying the proprietor of the service;

(vii) supporting and protecting the service while the pipeline is installed, inspected, tested and backfilled.

**PSDB 8.3.8 Soilcrete (New Sub-Clause)**

Add new Sub-Clause:

The unit measurement shall be the cubic metre (m<sup>3</sup>).

Soilcrete shall consist of an approved soil or gravel mixed with 5% by mass of Portland Cement and only sufficient water to give it a consistency that will permit the soilcrete to be placed, using vibrators. The material used for soilcrete shall be sandy granular material of the following specifications:

- Minimum Grading Modulus: 1,2
- Maximum Plasticity Index: 10 %
- Maximum particle size: 38 mm

Detrimental percentages of silt and clay shall be avoided.

The soilcrete shall be mixed on site using suitable concrete mixers and the water and cement contents shall be carefully controlled. It shall be placed and thoroughly compacted by means of concrete vibrators so that all voids are filled.

The unit rate shall also include for-

- supply of cement and any other materials required ;
- all mixing and processing of the material: and
- complying with any time restriction.

**PSDB 8.3.9 Construction Of Impervious Clay Barrier Across Pipe Trenches To Prevent The Flow If Groundwater In Bedding Material (New Sub Clause)**

Add new Sub-Clause:

The unit measurement shall be the cubic metre (m<sup>3</sup>).

Payment for impervious clay barrier across pipe trenches, as per the relevant drawing in terms of the instruction by the Engineer, will be by m<sup>3</sup> of material compacted to construct cross walls in accordance with the specification

**PSDB 8.3.10 Extra over for excavation of pipe trenches in areas of restricted access (New Sub Clause)**

The unit of measurement shall be square metre (m<sup>2</sup>).

Add new Sub Clause:

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality, covering restricted access, confined spaces, high traffic volumes, accommodating traffic where required, providing access for road users to properties, working in road reserves of various widths, working in working corridors of restricted width, working in the vicinity of archaeological findings or areas of historical importance which requires special care to be taken to protect same or whichever condition might present itself during construction.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other associated activities that are impeded as a result of difficult access, the management of traffic flow and all other aspects that require consideration in order to excavate the pipe trench.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions. Refer to SANS 1921.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under Item PSDB 8.3.2 and this item shall be deemed to include for all eventualities to excavate the pipe trench. No Extra Over for the excavation of pipe trench in areas of restricted access will be considered other than for the sections noted in the Bill of Quantities.

**PSDB 8.3.11 Ripping**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Ripping of the top 400mm layer of top soil to enhance establishment of new plants.

The tendered rate shall include for full compensation for plant, materials, fuel and labour necessary to ensure ripping of compacted tracks to a maximum depth of 400 mm.

**PSDB 8.3.12 Contour (Diversion) Berms**

Add new Sub Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include full compensation for the plant, labour and fuel to shape and compact contour (diversion) berms.

Measure per m length. Planting on berm is extra over to berm construction.  
Creation and finishing off of contour berms in terms of the specification.

**PSDB 8.3.13 Geofabric Product Application**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Geosynthetic application based on Engineer's decision what to use so quantities are provisional.

**PSDB 8.3.13.1 Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

**PSDB 8.3.13.2 Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

**PSDB 8.3.13.3 Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers

specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.

**PSDB 8.3.13.4 Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.



**PSDK        GABIONS (SABS 1200DK)****PSDK 1       SCOPE**

Add to Sub-Clause:

This specification also applies to Reno Mattresses, Terramesh and the materials that they are manufactured of. For simplicity the word “Gabion” is used and may be changed or have the words Reno Mattress and/or Terramesh added singularly or in combination as appropriate unless specifically stated otherwise. In general, for protection over large flat areas the word “mattress” describes the implementation of a small height gabion basket. The word “Plastic Coated” refers to a UV stabilised/resistant polymer coating extruded over the externally-coated wire.

**PSDK 2       INTERPRETATIONS****PSDK 2.3     DEFINITIONS**

Add to the Sub-Clause

Box dimensions for gabions are stated under sub-clause PSDK 3.1.2.

Wire for cages need to zinc/Al coated and not just zinc coated.

Mattress dimensions are sated under sub-clause PSDK 3.1.2.

**PSDK 3       MATERIALS****PSDK 3.1.1.1 Quality**

Add to the Sub-Clause:

The stone shall be subjected to the weathering test.  
The stone shall be subjected to the durability test.

### PSDK 3.1.2 Gabion Cages And Mattresses

Add to the Sub-Clause:

Wire for wire baskets (Mattress and/or Gabion structures) shall be double twisted hexagonal steel wire mesh manufactured to SANS 1580 with wire being coated with Galfan coating and additional outer Polymer PVC coating where required.

The gabion baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 80mm mesh made up from minimum of 3.4mm o/d frame wire and 2.7mm o/d mesh wiremesh wire to SANS 1580 coated in Galfan, complete with partitions at 1m centres, complete as described in SANS 1200DK and in the following sizes: -

<b>L</b>	<b>W</b>	<b>H</b>
1.0m	1m	.5m
1.0m	1m	1m
1.5m	1m	1m
2.0m	1m	1m
3.0m	1m	1m
4.0m	1m	1m

Gabion tails lengths as specified in the Bill of Quantities and/or on the drawings.

Mattress baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 60mm mesh made up from minimum of 2.2mm o/d mesh wire with zinc/Al5% coating, complete with partitions/diaphragms in the following sizes: -

<b>L</b>	<b>W</b>	<b>H</b>
2.0m	1m	.17m
2.0m	1m	.23m
2.0m	1m	.30m
2.0m	2m	.17m
2.0m	2m	.23m
2.0m	2m	.30m
3.0m	2m	.17m
3.0m	2m	.23m
3.0m	2m	.30m

### PSDK 3.1.3 Geotextile

Add to the Sub-Clause:

The geotextile shall consist of 100% polyester continuous non-woven filaments having a mass of 210g/m<sup>2</sup> with minimum energy absorption of 6.5kJ/m such as "AG200".

The filter blanket must be attached to the gabion wall, basket or mattress by an approved method of fastening, which must ensure that the blanket will stay in position during construction of the infilling behind the gabion wall. The material to be used as fill immediately adjacent to the gabion wall must have good drainage properties to ensure that there is no build up of pore pressure behind the wall and be free of sharp rocks that could damage the filter blanket.

**PSDK 3.1.6 Wire And Polymer Coating (New Sub Clause)**

New Sub-Clause:

The wire used for the fabrication of wire mesh cages for gabions or mattresses and for lacing and bracing operations shall be plain mild steel wire with external zinc aluminium(5%Al) coating and where required, with UV resistant Polymer coating.

Mild steel wire for gabion baskets shall be a minimum of 2.7mm thick before coating is applied.

Mild steel wire for mattress baskets shall be a minimum of 2.2mm thick before coating is applied.

It shall be capable of resisting effects of natural weather exposure, immersion in saltwater and not show any material difference in its initial characteristics over an extended period of time.

**PSDK 3.2 PITCHING****PSDK 3.2.1 Stone**

In Table 2, Column 2 for Extra heavy: delete "300" and replace with "500".

**PSDK 5 CONSTRUCTION****PSDK 5.2.3 Assembly**

Add to the Sub-Clause:

All cages shall be connected to adjacent cages by lacing the adjacent edges together with 2,7mm dia. coated wire. The lacing shall be in accordance with Sub-Clause 5.1.2.

All wire shall comply to the manufacturer's specifications and quality standards and the supplier of the cages' specification requirements.

**PSDK 5.2.4 Rock Filling**

Add to Sub-Clause:

Particular care shall be taken in the filling of gabions so as to ensure that the voids in the rockfill are reduced to the minimum which can be reasonably achieved. In order to minimise the voids in the rock filling, the filling shall proceed in layers not exceeding 300 mm deep and each layer shall be rodded and barred so as to compact the rockfill before filling of the next layer commences. Where appropriate, hand packing of selected rock particles shall be carried out.

Gabions and mattress cages are to be filled and packed in accordance to the manufacturers specifications and guidelines (In some cases soil fill may be required).

**PSDK 5.2.4.2 Mattresses used in Revetments and aprons**

Add to the Sub-clause:

Where gabions and mattresses are placed in exposed positions the rock particles forming the exposed faces shall be specially selected so as to present a fair and even surface.

**PSDK 5.3.4 Wired Pitching**

Add to the Sub-Clause:

The areas in which wired or grouted wire pitching is to be used will be indicated on site by the Engineer.

**PSDK 7 Tests**

Add to the Sub-Clause:

The Contractor is to provide proof of materials testing as described in the specification. An item has been allowed for additional testing should this be deemed necessary by the Engineer.

**PSDK 8 MEASUREMENT AND PAYMENT****PSDK 8.2.2 Gabions**

Delete the 2<sup>nd</sup> and 3<sup>rd</sup> sentence and replace with:

The unit of measurement shall be the cubic metre of the rock-filled cages. Where specified for Terramesh (or similar approved) the unit will be the cubic metre of imported rock or soil filled gabion. The quantity shall be calculated from the dimensions of the gabions indicated on the drawings, Bill of Quantities or prescribed by the Engineer, irrespective of any deformation or bulging of the completed gabions.

The Tendered rate shall include compensation for supplying all material, including rock or imported soil fill wire-mesh cages, Galvan coating or Galvan and Polymer coating as stated in the Bill of Quantities, tying and connecting wires, loading, transporting and off-loading, the assembly and filling of cages, and any other work necessary for constructing the gabions.

**PSDK 8.2.3 Extra Over Item 8.2.2 For Packing Selected Stone For Exposed Faces**

Add to the Sub-Clause:

The method of selecting and packing stone for exposed faces as scheduled, shall be as specified in Sub-Clause 5.2.7 - Special Finish.

**PSDK 8.2.4 Geotextile Or Geomembrane**

Add to Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The geotextile type shall be AG 200 Geotextile

**PSDK 8.2.8 Excavate Material For Gabions (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The tendered rate shall cover the cost of clearing, excavation, stockpiling, backfilling and compacting all material for gabions and to spoil the surplus material at the designated spoil site.

#### **PSDK 8.2.9 Foundation Trench And Backfilling (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The unit of measurement shall be cubic metre of excavation made in accordance with the authorized dimensions. The tendered rates shall include full compensation for excavating in each class of material, including unavoidable overbreak, trimming of trenches, compacting the trench inverts, backfilling and compacting the backfill, and the disposing of surplus excavated material at the designated spoil site

Foundation trenching and backfill in all classes of material, inclusive of spoil disposal at an approved spoil disposal site.

#### **PSDK 8.2.10 Surface Preparation For Bedding The Gabions (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The unit of measurement for levelling and preparing surfaces for receiving the gabion cages shall be the square metre to the neat dimensions for revetments, aprons or wall foundations. The tendered rate shall include full compensation for preparation, filling any cavities with rock and the levelling off the ground surface so as to be ready for receiving the gabion cages.

**PSDM EARTHWORKS (ROADS, SUB GRADE) (SABS 1200 DM – 1981)****PSDM 3 MATERIALS****PSDM 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES**

Amend this clause to be exactly as that described under clause PSD 3.1 of the Variations and Additions to the Standardised Specification for Earthworks (SABS 1200 D – 1988)

**PSDM 5 CONSTRUCTION****PSDM 5.1 PRECAUTIONS****PSDM 5.1.2 Accommodation Of Traffic**

Add to the Sub-Clause:

Traffic accommodation shall conform to the requirements of SANS 1921 and to any special clauses noted in this specification, where applicable.

**PSDM 5.2 METHODS AND PROCEDURES****PSDM 5.2.2.3(B) CUT TO SPOIL**

Delete Sub-Clause and replace with:

Spoil material is to be disposed of in accordance with the requirements of good environmental practises the EMP where applicable.

**PSDM 5.2.2.3(C) CUT TO FILL**

Add to Sub-Clause:

The order of excavating cuts shall be arranged to minimise the double handling of material. All road embankments shall be top soiled and rehabilitated.

**PSDM 5.2.3.2 Removal of unsuitable ground**

Replace the second sentence of paragraph (a) with the following:

The excavated spaces shall then be backfilled with approved imported natural gravel material compacted to 93% Mod: AASHTO density in layers not exceeding 150mm thickness.

Add the following sentence to paragraph (b):

Unsuitable material excavated will be paid for under cut to spoil.

**PSDM 5.2.4 Fill****PSDM 5.2.4.2 Placing and Compaction****PSDM 5.2.4.2(F)(1) COMPACTION**

Delete "90%" and replace with "93%".

**PSDM 5.2.4.3(E) TOPSOILING**

Delete "50mm" at the end of the first sentence and replace with "150mm".

**PSDM 5.2.5 Selected Layer**

Replace the second sentence of this clause with the following:

Sand shall not be used for the upper (G6) selected layer. Both the G6 and G8 selected layers shall be compacted to a lower specification limit (Ls) value of 95% and 93 % respectively of Mod. AASHTO density where gravel material is used. Where sand is used for the lower (G9) selected layer it shall be compacted to an Ls value of 100% of Mod. AASHTO density.

**PSDM 5.2.8 Transport**

Delete Sub Clause PSDM 5.2.8.1 and PSDM 5.2.8.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

**PSDM 7.2 PROCESS CONTROL**

Replace Table 1 with the following table:

**TABLE PSDM 1- TESTING FREQUENCY**

1	2	3	4
Test	Position in layer	Testing Frequency	
		Area or Volume to which one test is applied, max.	Number of tests per lot, min.
Density	Fill	250m <sup>3</sup>	4
	Top 300mm of fill and road bed	750m <sup>2</sup>	4
	Selected layer and gravel surface layer	500m <sup>2</sup>	6
Indicator	Top 300mm of fill and road bed	750m <sup>2</sup>	1
	Selected layer and gravel surface layer	500m <sup>2</sup>	1
CBR	Top 300mm of fill and road bed	500m <sup>2</sup>	1
	Selected layer and gravel surface layer	500m <sup>2</sup>	1

**PSDM 7.3 ROUTINE INSPECTION AND TESTING****PSDM 7.3.2 Routine Inspection And Testing**

Delete Sub-Clause and replace with:

All measurements and test results shall be assessed in accordance with Clause 7.3.3 of SABS 1200M : 1996 Roads (General), Appendix B: Statistical Judgement Plan .

Amend Table B.5 of SABS 1200M: 1996 as follows:

1	2	3	4	5	6
Material	Properties	Min.Sample Size (n)	Lower Spec. Limit (Ls)	Upper Spec. Limit (Ls')	Ø (%)
Fill (other sand)	Relative Compaction	4	93%	-	15
Fill (sand)	Relative Compaction	4	100%	-	15
Selected Layers (G7 and lower G9 gravel material)	Relative Compaction	6	93%	-	15
Selected Layers G10	Relative Compaction	6	90%	-	15

Add the following to Sub-Clause:

Sand shall be defined as material with a 0,075mm fraction less than 20% and shall be non-plastic (cohesionless).

All testing required for trench layerworks and fill under roads shall comply with PSDM 7.

## **PSDM 8 MEASUREMENT AND PAYMENT**

### **PSDM 8.3.3 Treatment Of Road Bed**

#### **PSDM 8.3.3(a) Road bed preparation and compaction of material to:**

Delete points 1 to 3 and replace with:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- 1) a minimum of 93% of Modified AASHTO maximum dry density
- 2) a minimum of 95% of Modified AASHTO maximum dry density
- 3) a minimum of 100% of Modified AASHTO maximum dry density

### **PSDM 8.3.4 Cut To Fill, Borrow To Fill**

Replace the heading and contents of this Sub-Clause with the following new Sub-Clauses:

#### **PSDM 8.3.4(a) Cut to fill (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- i) Compact to a minimum of 90% of Modified AASHTO maximum dry density.
- ii) Compact to a minimum of 93% of Modified AASHTO maximum dry density.
- iii) Compact to a minimum of 100% of Modified AASHTO maximum dry density.

The unit of measurement shall be the cubic metre of fill and the volume will be calculated in accordance with the authorised dimensions of the embankment and levelled cross sections.

The tendered rate shall include full compensation for the cost of excavating the material in the road prism as if in soft material, for transporting, preparing, processing, shaping (including forming side channels and benching where applicable), watering, mixing,



compacting to the specified density, and for finishing the slopes of cuts and fills complete as shown on the drawings.

Sub item (ii) above will only be paid where the material being processed is a non-cohesive sandy material and where the additional compactive effort is ordered by the Engineer in writing.

#### **PSDM 8.3.4(b) Borrow or Stockpile to fill from off site, pipe trench or commercial sources (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- i) Compact to a minimum of 90% of Modified AASHTO maximum dry density
- ii) Compact to a minimum of 93% of Modified AASHTO maximum dry density
- iii) Compact to a minimum of 100% of Modified AASHTO maximum dry density

The unit of measurement shall be the cubic metre of fill and the volume will be calculated in accordance with the authorised dimensions of the embankment and levelled cross sections.

The tendered rate shall include full compensation for the cost of procuring, furnishing, transporting, placing, processing, shaping (including forming side channels and benching where applicable), watering, mixing, compacting to the specified density, and for finishing the slopes of cuts and fills complete as shown on the drawings.

Sub item (ii) above will only be paid where the material being processed is a non-cohesive sandy material and where the additional compactive effort is ordered by the Engineer in writing.

#### **PSDM 8.3.5 Selected Layer Compacted To 93% MOD AASHTO Density (New Sub Clause)**

Add new Sub-Clause:

##### **a) Selected layer (G7 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

##### **b) Selected layer (G8 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

##### **c) Selected layer (G9 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

The unit of measurement shall be the cubic metre and the quantity shall be calculated from the authorised dimensions of the compacted layer."

The tendered rates shall include full compensation for excavating the material, loading, transpo11ing, offloading, spreading, watering, mixing, breaking down, compacting the layer

and trimming in terms of Sub-Clause 5.2.4.3(d) and Clause PSD 8.3.6. Should the material be sand, as permitted under item PSDM 5.2.5, compaction is to be increased to 100% Mod. AASHTO density, the additional compaction required shall be deemed to be included in the above rates.

The above items shall also include the requirements of Sub-Clause PSD 5.2.2.2.

### **PSDM 8.3.7 Cut To Spoil Or Stockpile From**

The unit of measurement shall be cubic metre (m<sup>3</sup>).

Add to Sub-Clause:

- i) Undercut below formation
- ii) Excess topsoil
- iii) Removal of unsuitable (soft) material in restricted areas (undercut)

Reinstatement of undercut area in iii) above shall be paid according to payment item PSDM 8.3.4.

### **PSDM 8.3.12 Overhaul**

The freehaul distance for this contract is unlimited. Contractors are to note that **no** overhaul will be paid.

### **PSDM 8.3.17 Construction Of New To Existing Road Joint ( New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measurement shall be the linear metre and the quantity shall be calculated from the net finished surface of the road. The new to existing road joint shall be constructed over the full depth of construction, from the top of the wearing-surface to the bottom of the lowest selected subgrade layer.

The tendered rate shall include for all labour, plant and material required to construct the new to existing road joint including cutting back and removing the existing road layers to the required width and depth as shown on the project drawings. The benching in the joint shall be formed prior to the new layerworks construction commences. The rate shall include for disposing of all unsuitable/surplus material. It should be noted that saw cutting, removing and disposing of the asphalt surfacing will be paid under PSC 8.2.11 & PSC 8.2.14."

**PSG CONCRETE STRUCTURAL (SABS 1200 G – 1982)****PSG 2 INTERPRETATIONS****PSG 2.1 SUPPORTING SPECIFICATIONS**

Add the following:

SANS 50197-1 or EN 197-1

SANS 1491 Part I: Ground granulated blast furnace slag (GGBS)

SANS 1491 Part II: Pulverised Fly Ash (PFA)

SANS 1491 Part III: Condensed Silica Fume (CSF)

**PSG 2.3 a) General**

Adverse weather

Delete the figure “25°C” and replace with “30°C”

**PSG 3 MATERIALS****PSG 3.1 APPROVAL OF MATERIALS**

Add the following:

If during the progress of the work, the contractor desires to use materials of proportions other than those originally approved, or if in the opinion of the Employer's Agent or their representative, the materials from the sources originally approved change in characteristics, he shall provide evidence satisfactory to the Employer's Agent that the new materials and/or new combination of materials will produce concrete meeting the requirements of the specification and will not bring about unacceptable changes in the appearance or other characteristics of the structure.

When any changes are made in terms of this subclause, they shall be made at the contractor's expense, and no extra payment will be allowed by reason of such change.

**PSG 3.2 CEMENT****PSG 3.2.1 Applicable Specifications**

Replace with the following:

No Ordinary Portland Cement having an equivalent sodium monoxide content (calculated as  $\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O}$ ) exceeding 0.6% by mass of the cement may be used in any reinforced concrete other than in combination with an approved coarse aggregate, which has been shown by testing to be non-reactive in respect of potential alkali-aggregate reaction.

Cementitious binders shall, unless otherwise specified, be common cements that comply with SANS 50197-1 or be blends of certain common cements and extenders that comply with SANS 1491-1, SANS 1491-2 or SANS 1491-3,

Ground granulated blast furnace slag (GGBS) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part I, as amended.

The type of cement to be used in any concrete element shall take into account the environmental conditions and durability requirements at the location of the site of the works and shall be approved by the Employer's Agent.

**PSG 3.2.2. Alternative Types of Cement**

Pulverised Fly Ash (PFA) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part II, as amended.

Condensed Silica Fume (CSF) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part III, as amended.

The minimum content of cementitious material shall be not less than 325kg and not more than 400kg per cubic metre of concrete for ordinary Portland Cement or not more than 450kg per cubic meter when cements containing ground granulated blast furnace slagment of Pulverised Fly Ash is used.

### **PSG 3.2.3. Storage of Cement**

Add the following:

No cement shall be stored on the site for a longer period than 28 days. After this period the Employer's Agent may call for tests to be carried out in accordance with SANS 50197-1 and 2 and if the cement complies it may be used. Cement, if not delivered in bulk for storage in an approved silo, must be stored in a separate room with a raised floor constructed of heavy planks supported on bricks, or similar. This room must be completely damp-proof and well ventilated. The cement sacks shall be closely stocked, not more than 12 sacks high, and shall not be stacked against the walls. The arrangements of stacking shall be such as to facilitate the cement being used in the same order in which it is received. Lumpy cement, broken pockets and sweepings shall not be used. Any bags of cement that show any degree of hydration or setting shall be removed from the site and replaced at the Contractor's expense.

### **PSG 3.3 WATER**

Add the following:

Water shall be obtained from the city water supply where possible and shall be taken from any other source only on the approval of the Employer's Agent. Where there is reason to suspect the presence of harmful impurities, the Employer's Agent may require the contractor to submit the results of approved tests.

Water for curing of concrete shall not contain impurities in sufficient amount to cause discoloration of the concrete or produce etching of the surface.

No sea water or water containing salts shall be used.

No water shall be added on site to ready mix concrete prior to placing to improve workability. All concrete delivered to site shall be checked for workability using the slump cone test and slump measured outside of the limit set from the design mix shall be rejected.

Water shall comply to SANS 51008.

### **PSG 3.4 AGGREGATES**

#### **PSG 3.4.1 Applicable Specification**

Replace the entire contents of the clause with the following:

- a) Both the fine and coarse aggregate shall comply with the relevant requirements of SANS 1083.
- b) The nominal coarse aggregate size in the structural concrete shall be in accordance with the specified class of concrete for each portion of the works.

Water demand of sand:

Sand with a water requirement in excess of 200ℓ /m<sup>3</sup> when made up into concrete with the intended mix proportions (including admixtures, if any) will not be allowed.

The drying shrinkage of both the fine and coarse aggregate, when tested in accordance with SANS 5836, shall not exceed the following limits:

- 5) For use in prestressed concrete, concrete bridge decks, slender columns and water retaining structures, the shrinkage of both fine and coarse aggregate shall not exceed 130% of that of the reference aggregate.
- 6) For use in other reinforced concrete members, the shrinkage of the fine aggregate shall not exceed 175% of that of the reference aggregate and the shrinkage of the coarse aggregate shall not exceed 150% of that of the reference aggregate.
- 7) For use in mass concrete substructures and unreinforced concrete head walls and wing walls, the shrinkage of both the fine and coarse aggregate shall not exceed 200% of that of the reference aggregate.

The drying shrinkage of concrete shall not exceed 0.040%, when tested in accordance with the requirements of SANS 6085.

### **PSG 3.4.2 Use of Plumbs**

#### ***PSG 3.4.2 (g) Add new sub-clause:***

The use of plumbs will not be permitted in any of the strength concrete specified on the Works.

### **PSG 3.4.4 Aggregate Quality**

Add New Sub-Clause:

Records of grading analysis tests on all the aggregate shall be kept.

Fine aggregate must be clean, naturally occurring, siliceous sand or approved crushed rock. The broken shell content determined in accordance with SANS Method 5840 must not exceed 30% by mass.

In addition, for water retaining structures the following shall apply: fine aggregate grading is to comply with the table below. It may be necessary to blend two sands in order to meet the grading envelope.

The maximum variance of the fineness modulus (FM) of the fine aggregate shall not exceed 0.2. Revision to the submitted mix design must be carried out where this becomes unavoidable.

Sieve size (mm)	% passing
4.75	90-100
2.36	75-100
1.18	60-96
0.60	40-60
0.30	20-40
0.15	10-20
0.075	5-10 (5-20) *

\* If crusher sand

The coarse aggregate shall all be retained on a screen with 4,75mm nominal aperture size with the exception of dust content, which shall not exceed 0.5% by mass. Flakiness indices determined in accordance with SANS Method 5847 must not exceed 30% in the case of 26.5mm aggregate size and 25% in the case of 19.0mm aggregate size respectively.

### **PSG 3.5 ADMIXTURES**

#### **PSG 3.5.1 Approval of Admixtures Required**

Add the following:

Admixtures may be used with the approval of the Employer's Agent in the design of concrete mixes to modify the properties of the plastic concrete.

The use of admixtures, which have a retarding effect on the rate of hydration of the cement, may not be used when the concrete temperatures are below 20°C.

A retarding admixture shall be used if the temperature of concrete mixes using cements of strength class 42.5 or higher is between 20°C to 30°C or where the ambient temperature is between 20°C to 30°C.

Admixtures containing chlorides shall not be used.

The Contractor must provide the following information for the approval of the Employer's Agent:

- The trade name of the admixture, its source and the manufacturer's recommended method of use
- Typical dosage rates and possible detrimental effects of under-dosage or over-dosage.
- The method and accuracy of dispensing the admixture.

All admixtures for concrete shall comply with the requirements of SANS 50934, ASTM C260 or AASHTO M194.

## **PSG 4**

## **PLANT**

### **PSG 4.1**

### **GENERAL**

Add the following:

When considered necessary by the Employer's Agent, stand-by equipment shall be available at short notice.

### **PSG 4.2**

### **BATCHING PLANT**

Add to the Sub-Clause:

Reports on the calibration of weight batching plant, clearly stating the date of the test, shall be submitted to the Employer's Agent.

In addition, when concrete is being mixed for water retaining structures the following shall apply:

The batching of concrete shall be done by weigh batching only, volume batching will not be permitted.

The Contractor shall ensure, by regular examination, calibration and tests, that the batching system functions efficiently and accurately, and that hoppers and cement containers are kept dry and clean. Proof of examination and calibration, clearly stating date of test shall be submitted to the Employer's Agent.

No mixed concrete shall be deposited directly onto the ground prior to placing. A board or other suitable platform is to be provided onto which the mixed concrete can be deposited whilst it awaits placing.

Excess concrete from mixing shall be deposited in a designated area awaiting removal to an approved landfill site, or for use in the reservoir embankment.

The Contractor will contain wash water from cement mixing operations, by directing the water into a sump for collection. The material contained in the sump will be removed to an appropriate landfill site or included in the reservoir embankment.

**PSG 4.5 FORMWORK AND FALSEWORK****PSG 4.5.1 Design**

Add the following:

The design of the formwork and falsework shall be the responsibility of the Contractor and shall be designed and detailed by a registered professional engineer, if required by the special conditions of contract, and submitted for approval by the engineer. All joints shall be either horizontal or vertical.

The formwork shall be designed to limit deflection to a value not exceeding 1/360th of the span between supports.

Chamfer strips 25mm x 25mm shall be provided on all exposed edges.

The design of all proposed formwork and falsework shall be subject to the approval of the Employer's Agent. Such approval shall in no way relieve the Contractor of their responsibility under the contract.

**PSG 4.5.3 Ties**

Add to the Sub-Clause:

The spacing and method of fixing shutters and filling of voids shall be subject to the approval of the Employer's Agent.

For water-retaining structures:

- (a) If sacrificial metal ties are used, they are to be drilled out so as not to extend beyond 60mm of concrete surface on the wet side of the wall and 50mm on the outside.
- (b) If plastic sheaths are used to permit removal of the metal ties, the sheaths are to be removed and the holes are to be completely removed by using an oversized drill bit to ream out the holes.
- (c) The surface of the hole is to be primed by wetting with a cement/SBR latex slurry and the hole filled by caulking with a cementitious mortar consisting of 1 part cement to 2 parts concrete sand by volume, well mixed with sufficient clean water to obtain the required consistency. The grout is to be well rodded into the hole to completely fill same and provide a dense void free plug. The surface is to be trowelled to finish flush with the surrounding area. The procedure shall be proven by the Contractor submitting a sample completed hole of each type for approval which shall then be regarded as the minimum acceptable standard for all other holes.

**PSG 5 CONSTRUCTION****PSG 5.1 REINFORCEMENT****PSG 5.1.1 Bending*****PSG 5.1.1.4 Welding of Mild Steel***

Add the following:

All welding of mild steel, where permitted, shall be in accordance with BS 5135.

**PSG 5.1.2 Fixing**

Add the following:

All reinforcement placed in structures within 5km of the sea should be washed with clean, fresh water after placement in the formwork and not longer than 24 hours prior to the casting of concrete.

The placing of bars on fresh layers of concrete, as work progresses will not be permitted. No concrete shall be placed until the Employer's Agent or their representative has stated that he is satisfied that the reinforcement is correctly positioned as shown on the drawings.

### **PSG 5.1.3 Cover**

Replace clause 5.1.3 with the following:

All concrete cover blocks used shall be of semi-spherical shape. The concrete cover blocks used shall have the same characteristic 28-day compressive strength as that specified for the respective structural concrete elements. Cover blocks shall not be less than 7 days old at time of installation and shall have been cured by full immersion in water for a period of not less than 3 days.

Binding wire used for fixing reinforcement must be tightly bound around the nodes at bar intersection with cut ends bent inwards. A nominal reduction of the minimum specified cover by 3mm will be allowed for binding wire. The reinforcing tie wire used in the manufacture of the cover blocks shall be hot dip galvanised. Great care is to be taken over the manufacturing of these blocks and the Contractor must ensure that when the blocks are made, the tie wires are not pushed too deep into the blocks. A minimum cover of 30mm must be maintained between the reinforcing tie wire and the conical end of the block.

**The minimum cover shall be as specified on the drawings.**

**For chambers minimum cover is to be 40mm.**

### **PSG 5.2 FORMWORK**

The surface of the floor, the internal upper surface of all footings and the upper surface of the roof and the slabs over the valve chamber shall be finished in accordance with clause PSG 5.2.1.1 class 4 – Steel Float Finish.

The surface of the blinding layer shall be finished in accordance with clause PSG 5.2.1.1 Class 3 – Wood Float Finish

All exposed internal and external surfaces of pump station to be finished in accordance with clause PSG 5.2.1 Class 2 – rubbed finish.

The internal surfaces of all walls, columns and the underside of the roof and all exposed surfaces shall be finished in accordance with clause PSG 5.2.1 class 3a – Smooth Finish.

All surfaces in contact with backfill material may be finished in accordance with clause PSG 5.2.1 class 1 – Ordinary Surface Finish.

#### **PSG 5.2.1 Classification of Finishes**

Replace the entire Clause with the following:

Surface finishes to formed concrete faces shall be classified as hereunder –

Class 1: ordinary finish;

Class 2: rubbed finish;

Class 3: off the form finishes;

(a) smooth finishes,

(b) board marked finishes,

(c) special patterned finishes,

Class 4: exposed aggregate finishes;

(a) brushed and washed finishes,

(b) tooled finishes,



- (c) sand blasted finish
- (d) aggregate transfer finishes,

Class 5: applied finishes;

- (a) rendered finishes,
- (b) painted finishes.

### **Class 1 – Ordinary Surface Finish**

This is the finish left on a concrete surface after the removal of the forms and the filling of all holes left by shuttering bolts and the repairs of all defects. The surface shall be true and even, free from stone pockets, depressions and projections.

### **Class 2 – Rubbed Finish**

Immediately after removal of the shuttering all defects shall be made good and the rubbed finish shall be applied within three days as follows:

Before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of 3 hours. Sufficient time shall have elapsed before the wetting down to allow the mortar used in the pointing of the bolt holes and defects to set properly. Surfaces to be finished shall be rubbed with a medium-coarse carborundum stone, using a small amount of mortar on its face. The mortar shall consist of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all projections and irregularities have been removed, all voids filled, and a uniform surface has been obtained. The paste produced by this rubbing shall be left in place for at least five days. The surface shall be smoothed by being rubbed lightly with a fine carborundum stone.

### **Class 3 – Off the Form Finishes**

Off the form finishes require a very high standard in concrete quality, formwork and technique. The intention is that no after treatment other than treatment of boltholes (which should be placed with regulatory and precision) should be required. Forms shall be unblemished and panels regular. Joints shall be a feature of the pattern and shall be handled with care. Reinforcement cover blocks shall be of semi-spherical shape to minimise their appearance on the finished surface.

- c) Smooth finishes may be obtained from non-absorptive linings to forms, form plywood, shutter board, or plastic faced board in new condition.
- d) Board marked finishes shall be obtained from the use of timber planks, which shall be dressed and thickened unless otherwise specified. When un-planed timber is specified, boards with a strong grain shall be mixed with boards with a less pronounced grain and not grouped together. The Employer's Agent shall indicate if all boards are not to be horizontal and a patterned panel effect is required.
- e) Special patterned finishes are required to reflect without blemish the surface of patterned hardboard, rubber, thermoplastic or other lining as specified.

### **Class 4 – Exposed Aggregate Finishes**

The purpose of these finishes is to relieve the uniform colour and texture of the concrete by exposing the aggregate, which shall be the normal size concrete aggregate except where otherwise specified. Attention is directed to the necessity for allowing for the material to be removed and ensuring that the requisite cover to reinforcement is maintained.

- f) Brushed and washed finishes are obtained by stripping and scrubbing the concrete surface with a stiff wire brush. Unless forms can be stripped at a very early age (approximately 16 hours at 20°C) this method cannot be used unless the formwork has been treated with a retarding agent. Care shall be taken to ensure that concrete is not deposited against the face of treated forms, which should be stripped as early as possible. Where scrubbing with water is not effective, a solution of hydrochloric

acid in the proportion of 1 part of acid to 4 parts of water shall be thoroughly and evenly scrubbed into the surface until the desired texture is obtained. The complete surface shall then be neutralised by washing thoroughly with water to which a small amount of ammonia has been added. When acid is used, special precautions shall be taken to protect workmen, underlying materials and persons passing.

- g) Tooled finishes may be carried out by the use of bush-hammers, light mechanical chisels or other approved tools, preferably mechanically operated. No tooling shall be done until the concrete has attained an age of at least 14 days after casting when normal Portland cement has been used and 7 days when rapid hardening cement has been used, or longer as may be necessary to prevent the aggregate particles from being dislodged.

The final finish shall show a surface of evenly distributed coarse aggregate particles set in a matrix of mortar, each aggregate particle being in slight relief. After the tooling has been completed, the surface so treated shall be scrubbed down with a stiff brush and washed with water.

- h) Sand blasted finishes shall be obtained by sand blasting the thoroughly cured concrete surface of the same ages as given under (b) Tooled Finishes with hard sharp sand to produce an even, fine, clean surface in which the mortar has been cut away, leaving the coarse aggregate exposed.
- i) Aggregate transfer finishes may be affected by sticking a single layer of selected aggregate onto plyboard or other suitable form liners which have been cut to size and coated with a layer of water-soluble cellulose adhesive mixed with plaster sand. This layer should be just thinner than half the average least dimension of the aggregate. When the glue is set the liners are placed in the forms which are then concreted, care being taken to protect the forms when placing and compacting. Liners shall be stripped after at least 3 days and the adhesive and sand covering the aggregate removed by scrubbing and washing.

### **Class 5 – Applied Finishes**

It is essential that all surfaces on which applied finishes are to be used shall be sound, clean and free of mould oil.

Defects shall first be made good.

- j) Rendered finishes require a good key. Unless otherwise specified this may be provided by flicking on to the previously soaked and still moist surface of 1 part cement to 2 parts of sharp sand. This shall be left untouched apart from curing.

The render coat shall consist of 1 part Portland cement, or Portland cement 15, ½ part slaked lime, 4 to 4½ parts of sand by volume and shall not be less than 5mm or more than 16mm in thickness.

If a second coat is required because of the irregularity of the concrete. The surface of the first coat shall be combed with uniform wavy lines to provide a key after it has begun to harden. The second coat may be applied the next day. If a scraped finish is specified the rendering shall be lightly scraped to achieve the desired effect with an old tenon saw blade or similar implement, after it has attained a biscuit like crispness. It shall then be lightly brushed and washed to remove loose particles.

All rendered finishes shall be cured.

- k) Painted finishes of the type specified shall be applied strictly in accordance with the paint manufacturer's instructions. Very smooth surfaces shall be acid washed, lightly sand blasted or rubbed with abrasive stones before being painted. Painting shall be delayed as long as possible and two coats applied unless otherwise specified.

**PSG 5.2.1.1 Concrete Upper Surface Finishes**

## Classification

Surface finishes to exposed (non-formed) concrete faces shall be classified as hereunder:

Class 1 – screeded finish

Class 2 – broomed finish

Class 3 – wood float finish

Class 4 – steel trowel finish

**Class 1 – Screeded Finish**

Immediately after placing, the concrete shall be screeded with a true edged wooden board working between forms or other guides set accurately to line and level. No mortar shall be added, and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after removing or tamping down the interfering aggregate.

**Class 2 – Broomed Finish**

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be broomed with a stiff broom or brush to expose the aggregate. Dust and loose particles shall be gently washed away once the desired relief has been obtained.

**Class 3 – Wood Float Finish**

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to a smooth and even finish using a wood float and including any additional 4:1 sand and cement as necessary.

**Class 4 – Steel Float Finish**

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to a smooth and even finish using a steel float and including any additional 4:1 sand and cement as necessary.

**PSG 5.2.2 Preparation of Formwork**

Add the following:

Shutter release oil or any other contaminants will not be permitted on any of the reinforcing steel.

Wedges and clamps shall be used in preference to nails for securing the form components and wire ties or tie bolts in reinforced concrete must be capable of complete removal after use, except as otherwise specified. Where oil is used it shall be applied before any reinforcement is placed in position.

**PSG 5.2.5 Removal of Formwork****PSG 5.2.5.2 Replace the Entire Contents with the Following:**

Where test cubes to determine stripping times are not made, the minimum periods, which shall elapse between the time of the placing of the concrete and the time of removal of the forms shall, unless otherwise agreed with the Employer's Agent, be in accordance with the table hereunder, where each day covers a full 24 hour period.

Minimum stripping time in days:

	CEM I	CEM I	CEM II/A & CEM II/ B (MAX 29% EXTENDER)	CEM II/A & CEM II/ B (MAX 29% EXTENDER)	CEMII/B (30-35% EXTENDER)	CEMII/B (30-35% EXTENDER)
TYPE OF STRUCTURAL MEMBER OR FORMWORK	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *
Beam sides, wall or unloaded cols	1	2	2	4	2	6
Slabs, with props left underneath	4	7	5	8	6	10
Beam soffits, props left under	7	12	8	14	10	17
Removal of slab props	10	17	10	17	12	21
Removal of beam props	14	21	14	21	18	28

\*Average daily temperature of the atmosphere adjacent to the concrete as measured by a maximum and minimum thermometer. When the average daily temperature is between 5°C and 15°C the minimum stripping times shall be interpolated from the table.

The table assumes that the member concerned is not subjected to any heavy construction loads and that the total force to be supported is not more than half the design load. Where heavier loads are to be carried, no stripping of soffits shall be permitted until the concrete has attained its full strength. Any days during which the average temperature was below 2°C shall be completely disregarded.

In the case of walls and columns the stripping times shall be determined by means of cube test results in the first instance, so as to ensure that no damage is caused to the structures by removing formwork.

#### **PSG 5.2.5.6 Thermal Shock and Thermal Contraction Cracking**

When it is possible that a temperature differential of 20°C or more may exist within the concrete or between the concrete surface and its surroundings, special precautions shall be taken by the Contractor to avoid thermal shock or thermal contraction cracking.

In order to minimize and control cracking that may result from temperature changes in the structure it is desirable that the contractor see the advice of specialists in the field of concrete technology and their recommendations regarding the control of cracking be implemented within the guidelines provided in the specification.

### **PSG 5.3 HOLES, CHASES AND FIXING BLOCKS**

Add to the Sub-Clause:

Fixing blocks for the attachment of fixtures may be embedded in concrete provided that the strength or any other desirable feature (such as appearance) is not in the opinion of the Employer's Agent, thereby impaired.

### **PSG 5.4 PIPES AND CONDUITS**

Add the following:

The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall not at any point be less than 40mm, or 5mm plus the maximum size of coarse aggregate, whichever is the greater.

The puddle flanged inlet, outlet, drainage and scour pipes shall be fixed in line and position under and in the walls by the Contractor as shown on the drawings. All pipework shall be cast into walls at the time of pouring.

The use of “windows/ box outs” to cast in pipework at a later date shall not be permitted for cast in items.

## **PSG 5.5 CONCRETE**

### **PSG 5.5.1 Quality**

#### ***PSG 5.5.1.1 General***

Add to G 5.5.1.1

The concrete shall also comply with the requirements for Durability stated in PSG 7.3.8

#### ***PSG 5.5.1.4 Chloride Content***

Replace the entire contents of the clause with:

The chloride content, measured as Cl<sup>-</sup>, of all concrete in the structure as measured by BS 1881:124:1988 shall not exceed 0.2% mass cementitious binder.

The maximum chloride content of fine aggregate shall be 0.2% by mass as Cl<sup>-</sup> as measured by SANS 202:2006

#### ***PSG 5.5.1.5 Durability***

Add to the Sub-Clause:

The exposure conditions at the site of the Works are to be considered as being severe

#### ***PSG 5.5.1.6 Prescribed Mix Concrete***

Delete the Sub-Clause and substitute the following:

Unless the Design mix is detailed on the drawings or in the Specification, all concrete shall be Strength concrete.

#### ***PSG 5.5.1.7 Strength Concrete***

Add to G 5.5.1.7

Unless otherwise agreed to by the Employer's Agent, the concrete mix is to be designed by an approved laboratory.

At least four weeks before placing any concrete on the Works, the Contractor shall supply and deliver to the approved laboratory, at their own cost, samples of the aggregates he proposes to use in the concrete mix

The minimum content of combined cementitious material shall not be less than 325kg/m<sup>3</sup> and the maximum water/cement ratio shall be 0.5. The Contractor shall also submit for approval the proposed slumps and the proportions in which he proposes to use the materials for each grade of concrete in each type of construction.

In addition, the Contractor shall state the minimum cement / water ratio in terms of total water in the mix for each grade of concrete, and the use of any admixtures.

No structural concrete shall be placed on the job until the contractor has satisfied the Employer's Agent as to the suitability of the mixes concerned.

The laboratory will be bound by the requirements of this Specification which are to guide the Contractor in pricing the grade of strength concrete. The Contractor is to allow in their rate for strength concrete an amount to cover the fees and charges levied by the approved laboratory in designing the strength concrete mix.

Add:

**PSG 5.5.1.8 Bleeding**

Concrete shall be so proportioned, and materials so selected that bleeding is kept below 0.30mm/cm<sup>2</sup> as measured by the ASTM C232 – 99 tests.

Add:

**PSG 5.5.1.9 Shrinkage**

The drying shrinkage of concrete shall not exceed 0.040%, when tested in accordance with the requirements of SANS 6085.

Add:

**PSG.5.5.1.10 Temperature and Hydration of Concrete**

The temperature of the concrete shall be measured when it is delivered to site from a batch plant or a concrete supplier and shall be within the range 10°C and 30°C. Concrete which has a temperature outside of that range shall not be placed in the structure.

If slump loss occurs more than two hours after mixing, the concrete shall be rejected.

Care must also be taken not to cast concrete onto hot steel shutters as this might induce cracking.

The rate of hydration of the cement in the concrete shall be such that the concrete can be placed and properly compacted, 2 hours after the addition of water to the mix even in hot weather. Conversely, the initial set of the concrete must not be unduly delayed by low temperature, inappropriate use of admixtures or cement type, so that bleeding is promoted.

Add:

**PSG 5.5.1.11 No Fines Concrete**

Add new Sub-Clause:

No-Fines concrete shall be composed of cement and coarse aggregate only, the fine aggregate being omitted from the mix.

The stone shall comply with the grading requirements of 19mm single-sized crushed stone to table 7 of SANS 1083.

Only sufficient water shall be added to the mix to produce a smooth grout to completely cover each and every particle of aggregate.

Portions may be varied on site with the approval of the Employer's Agent to obtain a more satisfactory result. The upper surface of the no-fines is to be finished off with a wood float to provide a smooth working surface while adding just sufficient dry mix mortar (1:8) to close the upper surface of voids in order to prevent the ingress of foreign matter into the interstices.

No-Fines concrete shall be placed within 20 minutes of having been mixed and shall be rodded and hand tamped into position. The use of vibrators will not be permitted.

No traffic shall be permitted to traverse the surface of the no-fines concrete during the three days after placing and then only over planks or boards placed for that purpose.

**PSG 5.5.2 Batching****PSG 5.5.2.1 No Site Blending of Cement Extenders will be Permitted.****PSG 5.5.2.2 Water**

Replace entire contents with the following:

Dependable equipment shall be provided for measuring the mixing water either by mass or by volume to an accuracy within 2%.

The accuracy of the measuring device provided shall be checked whenever required by the Employer's Agent or their representative by allowing it to discharge into vessels of accurately known capacity.

The total quantity of water allowed for shall include the free water present in the aggregates. The moisture content of the fine aggregate shall be determined at the beginning and halfway through each concreting shift, after showers of rain or at such other intervals as may be required by the Employer's Agent.

### ***PSG 5.5.2.3 Aggregates***

Replace entire contents with the following:

Each size of aggregate shall be measured separately by weighing to an accuracy of 3% except where other methods are authorised or ordered by the Employer's Agent.

Where suitable volumetric methods of measuring proportions of aggregates are permitted, these shall be checked at regular intervals, and shall take full account of bulking of the fine aggregate as delivered to the mixer. These methods shall be designed in such a manner that the consistency of the mix shall be as readily controlled as for mechanical batching.

All measuring devices shall be maintained in good order and condition, and no build-up of material on any part of the equipment shall be permitted.

## **PSG 5.5.3 Mixing**

### ***PSG 5.5.3.1 Mixing at Construction Site.***

Add the following:

Mixing shall continue until there is a uniform distribution of the materials and the mixture is uniform in colour. The minimum period of mixing shall be not less than that recommended by the manufacturers at the recommended speed and not more than 30 minutes. The entire contents of the mixer shall be removed from the drum before the materials for the succeeding batch are loaded.

Where hand mixing is permitted, the quantities of cement used shall be increased by not less than 10% over those determined for the appropriate mix design. The concrete shall be mixed on a clean and watertight platform.

### ***PSG 5.5.3.2 Ready Mixed Concrete***

Add the following:

The concrete batching plant is to be inspected by the Employer's Agent for compliance with SANS 878 tolerances and their approval is to be obtained in writing before commencement of the concrete works.

A maximum delivery period of 90 minutes from the time water is added to the concrete mix to the actual discharge of concrete on site shall be permitted. The discharge period (including placing the concrete) shall not exceed 30 minutes.

The concrete slump of every truck shall be measured on delivery and shall comply with relevant parts of the SANS 878 specifications and this specification prior to any concrete from that truck is placed.

Where possible, dedicated truck drivers shall be used for the delivery of the concrete to site.

A detailed computer printout of the constituents of the concrete mix from the batching plant is to be handed over to and retained by the Employer's Agent's Representative on site on arrival (i.e. truck registration, mix proportions and the time water was added to the mix). The masses of the concrete constituents of each truck shall be checked against that of those submitted with the trial mix, subject to the batching accuracy as specified in SANS



878 The arrival time of each truck on site and the time that the concrete discharge is completed shall also be recorded by the Employer's Agent's Representative.

Before any ready-mixed concrete is used on the job, the contractor shall furnish the Employer's Agent with a copy of their letter to the suppliers in which he specified:

- (i) the type of cement;
- (ii) the nominal maximum size of aggregate;
- (iii) the cement / water ratio;
- (iv) the required compressive strength;
- (v) the required slump at the time and place of delivery; and
- (vi) the type of additive.

All these properties shall be as specified in the contract documents.

When required the Contractor shall satisfy the Employer's Agent that acceptable alternative means of supplying concrete have been arranged to be brought into operation in the event of disruption in the supply of concrete. In this connection, the Employer's Agent may require that the alternative means of supply shall commence if the disruption in the supply of ready-mixed concrete has lasted for an elapsed period in time of 1½ hours.

The use of ready-mixed concretes shall in no way relieve the contractor of any of their responsibilities for providing concrete complying with the specifications.

For grade 35/19 concrete, a CEM I or CEM II cement may be blended with pulverised fly ash (PFA) or ground granulated blast furnace slag (GGBS) and/or condensed silica fume (CSF), such that the combined cementitious material comprises not less than 60% cement clinker and a maximum of 40% of extender and/or other additional constituents by mass.

The minimum content of combined cementitious material shall not be less than 325kg/m³ and the maximum water/cement ratio shall be 0.5.

The concrete mixes for the abovementioned grades of concrete shall be designed by an approved concrete design laboratory. At least four weeks before placing any structural concrete on the site, the Contractor shall supply and deliver to the laboratory, at their own cost, samples of the aggregates and the concrete mix design he proposes to use for the works. The Contractor shall include in their tender all fees and charges levied as well as all other costs incurred in designing the required strength concrete mix.

The contractor must submit the ready-mix suppliers concrete mix designs on a D2 Concrete Mix Design form for approval. The required backup documentation in the form of test results shall also be included and is to comply with SANS 1083. Failure to submit the required information will result in the rejection of the concrete mix. The contractor must allow sufficient time to receive the required information and submit to the Employer's Agent for approval.

#### **PSG 5.5.4 Transportation**

Add the following:

Containers for transporting concrete shall be cleaned of all hardened concrete and foreign material.

During transportation the concrete shall be protected from wind and sun; shall be prevented from drying out or losing moisture and shall not be subjected to excessive jarring or jolting. Drying out may be prevented by the provision of covers and / or other protective devices.



**PSG 5.5.5 Placing**

Add the following:

Where plums are permitted, they shall be deposited by hand.

Freshly placed concrete shall be protected from rain damage.

No concrete shall be placed if the air temperature in the shade is falling and is below 8°C or is rising and is below 5°C. Concreting shall not commence if the air temperature in the shade is above 35°C. The temperature of the concrete at the point of placing shall not exceed 30°C unless otherwise specified.

***PSG 5.5.5.5 Dropping of Concrete (new heading)***

Add to the Sub-Clause:

Dropping concrete freely will only be permitted if the Employer's Agent is satisfied that this is the only practical method of placing.

***PSG 5.5.5.9 Pumping of Concrete***

Delete the Sub-Clause and substitute the following:

The placing of concrete by pumping will not be permitted without the written approval of the Employer's Agent. The design concrete mix has to be approved by the Employer's Agent should pumping be allowed.

***PSG 5.5.5.10 Blinding Layer (New Sub-Clause)***

Add new Sub-clause:

Beneath all structural grades of concrete, or where shown on drawings or elsewhere if so ordered by the Employer's Agent, the bottom of the excavation is to be covered by a blinding layer (screed) in Grade 15MPa concrete to a minimum depth of 75mm to prevent disturbance of the ground and to serve as an even, clean and accurately positioned working floor for setting steel and placing foundation concrete. This blinding layer shall be laid within a day after excavations have been taken out, trimmed to the required depths and have been inspected and approved by the Employer's Agent.

Blinding concrete shall be measured per square metre and shall include for formwork and for a Wood Float Finish true to falls.

***PSG 5.5.5.11 Continuous Pours***

Add new Sub-Clause:

In the case of continuous walls, these are to be cast in lifts of such height that each lift can be poured uninterrupted in one continuous operation over the entire perimeter of the wall. No vertical or inclined construction joints of any kind will be permitted in continuous walls unless they have been specifically ordered or authorized by the Employer's Agent.

The placing of concrete shall commence at convenient points on the perimeter of the wall and shall proceed both ways simultaneously so that fresh concrete meets fresh concrete. Any rest pauses, such as for meals, shall be avoided as far as possible, and the Contractor may be required by the Employer's Agent to make the operation continuous by working in shifts. A workable arrangement must be made before each concreting operation commences.

**PSG 5.5.6      Compaction**

Add:

**PSG 5.5.6.5**

If required by the Employer's Agent concrete shall be re-worked by re-vibration 1 to 3 ½ hours after placing. The time shall be decided by the Employer's Agent, taking cognisance of the mix, the ambient temperature and the workability of the concrete.

**PSG 5.5.7      Construction Joints*****PSG 5.5.7.1    Add the Following:***

Any additional construction joints required by the contractor shall be approved by the Employer's Agent. Where "off the form" finishes are specified, joints shall be arranged to coincide with the edges of boards or panels wherever possible.

Only those construction joints shown on the drawings shall be measured and paid for. The contractor shall allow in their pricing for any additional construction joints that he may require.

**PSG 5.5.7.3(B)**

Construction Joints when concrete is more than 24 hours but not more than 3 days old.

Delete and replace with the following:

The surface of the concrete shall be sandblasted or chipped with a light hammer, swept clean and thoroughly wetted. In addition, the first layer of concrete placed in walls over a depth of approximately 250mm shall be made richer by reducing the amount of coarse aggregate by 25%.

***PSG 5.5.7.4    Preparation of Construction Joints (new heading)***

Add the following:

- l) All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles and shall be prepared to the satisfaction of the Employer's Agent. Formed keys shall be provided if shown on the drawings or if instructed by the Employer's Agent. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb and shall be constructed to the details shown on the drawings.
- m) The Contractor is to provide a compressor (with oil traps) on site for the whole period during which concreting is in progress, and this must be available for cleaning concrete faces prior to placing fresh concrete or pouring joints. The cost of this plant and operation is to be allowed for in the Contractors rate for concrete.
- n) "Blowing-off" may generally be carried out on horizontal surfaces but, under special circumstances approved by the Employer's Agent, it may be carried out on vertical surfaces. The surface concrete to be prepared shall be between 4h and 8h old after completion of placing and shall be blown off using a mixture of air and water under a pressure of at least 500kPa or by using a high pressure water jet until all dirt, laitance, etc is removed and particles of clean coarse aggregate are exposed sufficiently to produce a rough surface. Any loose particles of coarse aggregate shall also be removed. The success of this method of preparation depends on selecting the correct time (dependant on the type of cement and atmospheric conditions) so that the concrete has set to just the necessary degree of hardness. The operation may therefore require to be undertaken outside normal working hours and at night. When the surfaces are at least 12h old any remaining loose or fine aggregate particles shall be washed off.
- o) "Scabbling", which refers to removal of all surface laitance plus roughening the concrete surface with (pneumatic) picks in order to expose the coarse aggregate in

a uniform pattern, may be carried out on both horizontal and vertical surfaces. These areas should then be cleaned with a stiff brush under running water. The surfaces to be prepared in this manner shall be at least 12 hours old after mixing the concrete. At least 35% of the roughened surface area shall consist of exposed coarse aggregate. All surfaces prepared by "scabbling" shall be kept continuously wet until the next lift of fresh concrete is to be placed against them; the maximum time being 12 hours.

- p) No fresh concrete shall be placed on the top surface of concrete which is laterally restrained (e.g. by formwork or by in-situ earth) while the bottom layer of concrete is between 3 hours and 12 hours old after mixing. No fresh concrete shall be placed on top of the concrete with an unrestrained lateral surface while the bottom layer of concrete is between 2 hours and 12 hours old after mixing.
- q) The use of approved wet-to-dry epoxy resin concrete adhesive, strictly in accordance with the manufacturer's instructions, will be permitted in the formation of concrete joints at surfaces where the concrete is older than 7 days.

The internal surface of joints in the reservoir floor and walls shall be sealed with a surface mounted "Hypalon" bandage system having an epoxy fixing system, all materials and procedures conforming to the "Sikadur-Combiflex" surface sealing system as produced by Sika (Pty) Ltd, or similar approved. The Contractor must ensure that where one Hypalon joint intersects another (at right angles or otherwise) that the two layers of intersecting hypalon are not epoxied to each other and thereby restrained from moving. ie. the Hypalon inside an intersecting joint must not be restrained by the epoxy adhesive and the full intended width should be free to move in the intended directions.

A 1mm thick Hypalon bandage is to be used on walls less than 6.5m and a 2mm thick bandage is to be used on walls greater than 6.5m.

The construction joints on the top (and sides where detailed on the drawings) of the reservoir roof slab are to be sealed with a 75mm wide self-adhesive aluminium foil strip (Bostik "Ditsit" or similar approved) which shall be installed in accordance with the manufacturer's instructions. The "Ditsit" is to be taken over the edge of the roof slab and down the side of the wall for a distance of 500mm.

The construction joints on the soffit of reservoir roof slab are to be sealed with 2 coats of a 75mm wide application of SikaTop-Seal 107 (or similar approved) applied in accordance with the manufacturer's recommendations. The soffit of the reservoir is to be ground down 1.5mm to 2.0mm with an angle grinder and then wire brushed and sprayed clean with water. The slurry is to be applied to a damp surface.

#### **PSG 5.5.7.5 Water Stops**

Add the following:

Water stops are to be placed in all wall and floor construction joints to the manufacturer's specification. The water stop in the floor joints will be "rearguard" type "Expandite Supercast Rearguard R" or similar approved and in the walls will be "dumbbell" type "Expandite Supercast Watafoil" or similar approved as specified on the drawings.

Water stops, where specified, shall be placed or kept in position as shown on the drawing. Care shall be taken during concreting to ensure that water stops are not displaced, bent over or punctured.

All water stops shall be manufactured from virgin polyvinyl chloride that complies with the following minimum performance requirements:

Tensile strength	12.2MPa	(min)
Elongation at break	250%	(min)
Water soluble content	0.15%	(max)
Softness (BS 2571)	38 to 50	

They shall be of the dumb-bell type and eyeleted or supplied with metal clips for the purpose of accurately fixing the waterstop between the reinforcement.

In each construction joint 150mm wide PVC water stops shall be placed as shown on the drawings.

All intersection points shall be factory made pieces.

All joints in straight lengths and between straight lengths and intersection places shall be hot welded in accordance with the manufacturer's instructions. Jointing other than by hot welding will not be permitted.

Water stops shall be carefully positioned and tied to the reinforcement to prevent displacement. Every precaution shall be taken to ensure maximum compaction around the water stop. The water stops shall then be returned to their horizontal positions ensuring that no voids are formed beneath them.

## **PSG 5.5.8 Curing and Protection**

### **Replace entire contents of G 5.5.8 (d) with the following and remove G5.5.8 (e)**

Freshly poured concrete surfaces not covered by shuttering shall be covered with an inner hessian membrane and an outer plastic membrane, free from rents and tears and lapping by not less than 150mm. The hessian and plastic membrane are to be firmly secured and kept flush to the concrete surface at all times.

The hessian membrane is to be kept continuously damp.

All curing activities shall be well managed and shall take place under the control of the quality control officer with all activities being logged against a quality control sheet in terms of the quality plan for the Contract

#### **Add the following:**

(f) retaining forms in place

(g) steam curing may be used on approval as specified by the Employer's Agent, provided that the rate of increase in temperature does not exceed more than 20°C per hour. Steam curing at higher than atmospheric pressure shall not be permitted if the concrete contains limestone aggregate. Humidity shall be kept between 90% and 100%.

(h) the use of curing compounds will not be permitted

(i) The use of alternative methods is subject to approval of the Employer's Agent.

#### **Delete the last two sentences of G 5.5.8 and replace with:**

Whatever method of curing is adopted, its application shall not cause permanent staining, contamination or marring of the surface of the concrete.

The minimum period of curing various types of cement shall be as follows:

1	2	3
Strength class of cement	Minimum curing period, d	
	Ambient temperature	
	15°C and higher	5°C and lower
42.5 R or higher	3	6
CEM I and CEM II A-S, D, P, Q, V, A, W, T, L, LL, M and blends of CEM I with 20% or less ground granulated blast-furnace slag or fly ash	7	14
CEM II B-S, P, Q, V, W, T, L, LL, M, CEM III, CEM IV, CEM V and blends of CEM I with more than 20% ground granulated blast-furnace slag or fly ash	10	20
NOTE When the ambient temperature is between 5°C and 15°C, the curing period shall be determined by interpolation between the given periods.		

During periods of extreme temperatures, these periods may be increased at the discretion of the Employer's Agent. The temperature of concrete shall be retained above 5°C for a period of 3 days after placement. Should the environment in which the concrete is placed be such that temperatures drop below 5°C in the concrete, then use shall be made of insulated formwork to retain the heat generated by cement hydration within the concrete.

Curing methods to be utilised for water retaining structures:

Concrete Element	Curing Method
Reservoir water tank floor slab	PSG 5.5.8, (d) *
Reservoir water tank walls	PSG 5.5.8. (f)*
Top surface reservoir roof slab	PSG 5.5.8 (d) *
Soffit of the reservoir roof slab	PSG 5.5.8 (f) *
Reservoir internal columns	PSG 5.5.8 (d)*or (i)

\* - As amended

The rates for "Curing of Concrete" in the Schedule of Quantities will be paid to the Contractor on the successful outcome of the durability tests.

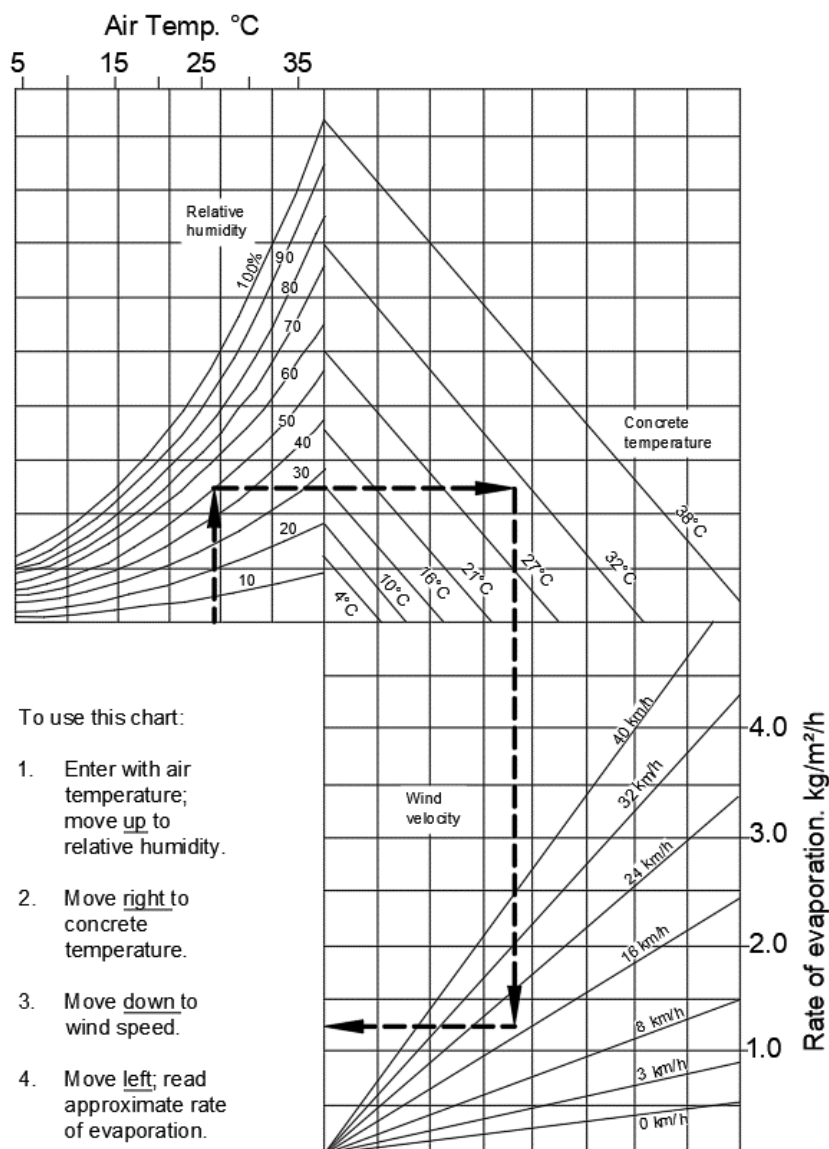
## **PSG 5.5.9 Adverse Weather Conditions**

### ***PSG 5.5.9.2 Delete Reference to 32° and Replace with 30°C.***

#### ***PSG 5.5.9.4 Weather Station***

The Contractor is to provide equipment to monitor the wind speed, relative humidity, temperature and hence calculate evaporation rates at the site. The equipment must be able to record and store data for a minimum period of 60 days and have download capabilities. Data shall be downloaded by the Contractor and this data shall form part of the quality control data for the Contract.

The figure below taken from **ACI 305R-99, Hot Weather Concrete (2000)**, provides a graphical method for estimating the water loss due to evaporation in various weather conditions and shall be used by the Contractor to determine and monitor the evaporation rate, particularly when planning for and during concrete placement. The windspeed, temperature and relative humidity shall be measured at least 2m above the evaporating surface.



If the rate of evaporation exceeds 0.5kg/m<sup>2</sup>/hour, the exposed concrete surfaces shall immediately be protected to prevent plastic cracking. It should be noted that plastic cracking may occur in cool weather with high wind velocities as well as in warmer weather conditions.

If in the opinion of the Employer's Agent, the weather conditions are too extreme and run the risk of adversely affecting the concrete, he may instruct the Contractor not to pour any more structural elements that day.

The Employer's Agent may call for protection against the wind to be provided, or the finished concrete to be covered with a plastic sheet or a fog spray to be utilised. Similarly, if it appears likely to rain, the Employer's Agent may instruct the Contractor not to pour any further concrete. An extension of time (without time related general costs) may be allowed at the Employer's Agent's discretion for delays incurred due to inclement weather. Any additional costs for these delays and/or protective measures are to be allowed for in the Contractors rates for concrete work. Curing of concrete for completed sections shall take place as detailed under the clause PSG 5.5.8.

**PSG 5.5.10 Concrete Surfaces*****PSG 5.5.10.2 Delete and replace with the following:***

Where a wood-floated or steel-floated or power-floated finish or a screed topping or granolithic finish is required in terms of the project specification, the concrete shall, unless otherwise stated in the project specification to a degree of accuracy II:

***PSG 5.5.10.4 Blowholes***

Add:

The Contractor shall make every effort to prevent blowholes from appearing on the off the form smooth finish. All noticeable defects shall be repaired to the Employer's Agent's satisfaction.

**PSG 5.5.12 Concrete in Wet Ground**

Delete the Sub-Clause and substitute:

Where concrete has to be laid in wet ground (e.g. River crossings) steps must be taken to lower the water level to at least 150mm below the bottom level of the concrete, and such level must be maintained for a period of at least two days after the concrete has been poured.

The cost of any necessary drains, sumps and pumping etc. necessary to achieve this shall be included in the tendered rates for the construction work and no separate payment shall be made for such dewatering throughout the construction period.

The Contractor shall be fully responsible for keeping the excavations free from water whilst the construction work is being carried out. The methods by which he proposes to achieve this shall be approved by the Employer's Agent before being implemented.

**PSG 5.5.13 Grouting**

Add to the Sub-Clause:

Grouting shall be done to the approval of the Employer's Agent using materials of suitable consistency as follows. Unless otherwise directed, the grouting admixture shall be added to 1 part cement and 2 parts concrete sand by volume, well mixed and with sufficient water added to obtain the required consistency. Where recesses to be filled are of appreciable dimensions, the Employer's Agent may direct the Contractor to replace a proportion of sand with fine stone to reduce shrinkage. The Employer's Agent may also require the Contractor to use non-shrink or other additives in grouting mixtures.

***PSG 5.5.13.1 Grouting of Pipes/Specials through Wall (New Sub-Clause)***

Add new Sub-Clause:

Where entry holes for pipes/specials have been provided in the walls, the Contractor shall be responsible for the grouting in of such pipes/specials regardless of whether or not these have been supplied by himself.

Before commencing the positioning in holes of any pipes/specials the Contractor shall:

- Remove all shuttering and boxing remaining in the holes
- Make any alterations required to the position and shape of the holes and reinforcing steel (lacing bars, etc) in the holes
- Thoroughly clean and scabble the sides of the holes so as to obtain satisfactory bond surface for the new concrete

After accurately positioning the pipes/specials in the respective holes, the Contractor shall fix the pipes/specials in a suitable manner to prevent movement.

Immediately prior to grouting being carried out by the placing of mortar and concrete around the pipes, the surface of the existing concrete shall be saturated with water. All surplus water shall be



removed, and the surface covered with a layer, approximately 12mm thick, of mortar consisting of 3 parts concrete sand and 1 part cement.

The concrete ingredients shall be mixed and placed as dry as possible to obtain a dense, waterproof concrete. Where a watertight seal is required, the concrete shall be carefully worked around the puddle flange, if any, and the pipe barrel or body of the special and shall be vibrated in layers so as to obviate any falling away from pipe/special surfaces of the concrete already placed.

The hole shall when set, form a dense, homogeneous and waterproof mass.

A spare vibrator with an independent power source shall be kept as a standby measure to ensure continuity of placing in the event of the breakdown of the duty vibrator.

Smooth formwork that has been suitably strengthened for use with a vibrator shall be provided for facing the concrete around each pipe/special.

### ***PSG 5.5.13.2 Dry-Packed Grout (New Sub-Clause)***

Add new Sub-Clause:

When dry-packed grout is specified under baseplates etc., only sufficient water shall be added to make the mixture ball when squeezed in the hand. Before any grouting is done with dry caulking, the surfaces between which the caulking is to be placed shall first be thoroughly cleaned and flushed with water.

All surplus visible water shall be wiped or blown away and the dry caulking shall be forcefully rammed or hammered into place using suitable tools. Exposed surfaces shall be finished off neatly with a trowel and extensive exposed areas shall be covered with wet sacking and kept damp for at least 24 hours.

Where additives are required for grouting operations, these shall be brought on to site in the manufacturer's unopened containers and used strictly in accordance with the manufacturer's instructions. The Contractor shall undertake preliminary tests to check the behaviour of proprietary additives under the conditions pertaining to the site.

### ***PSG 5.5.13.3 Epoxy Grout (Epoxy mortar type only) (New Sub-Clause)***

Add new Sub-Clause:

The manufacturer's instructions shall be observed when an epoxy grout is used.

### ***PSG 5.5.14 Defects***

Replace the first line of G 5.5.14.1 with the following:

The concrete shall be homogeneous and free from honeycombing, interstices, planes of weakness and cracks.

Add the following to G 5.5.14.1:

The concrete for the water retaining structures (including the roof) shall be as dense as possible and no honeycombing permitted. If honeycombing is found to be a problem, the Contractor shall re-assess the concrete mix proportions and their concrete placing methods. No additional payment shall be made for adjustments to the concrete mix or placing methods.

Add the following to G 5.5.14.2

All authorized concrete repair work will be carried out as described below taking cognisance of the fact that repair mortars containing PVA Latexes shall not be used in any water retaining structures.

#### **1 Honeycombing:**

The area to receive patch material shall be primed with a bonding slurry (e.g. Sika MonoTop 610 or similar approved). The patch will then be built up while the slurry coat is still tacky by means of an approved cementitious polymer modified mortar (e.g. Sika MonoTop 615 HB Prostruct 528 or similar approved).

#### **2 Shrinkage cracks:**



A low viscosity solvent free structural epoxy resin is to be used to fill the cracks (e.g. Sikadur 52, ABE Epidermix 365/389 or similar approved).

#### **PSG 5.5.14.3 Patching and Repair**

Where defects do not warrant the removal of defective concrete, one or more of the following procedures shall be required by the Employer's Agent:

- r) Where the structural strength might be affected and must be restored, repairs may be affected by the application of either pneumatically placed mortar or of a mortar made of silica sand and an approved epoxy formulation mixed and applied in accordance with the manufacturer's recommendations.
- s) Where there are no fears as to structural strength, all defective material shall be chipped away until a dense uniform surface of concrete exposing solid coarse aggregate is obtained. Feathered edges shall be cut away to from surfaces perpendicular to the concrete face. Seized shutter bolts shall be cut back to at least 35mm into the concrete. All loose material shall be hosed away, and the surface of the cavity shall be saturated with water for at least 3 hours, after which a thin layer of neat cement mortar shall be applied to the surface. The cavity then shall be filled with stiff mortar mixed in the same proportions of cement to sand as that used in the original concrete. The mortar shall be thoroughly tamped into place in layers. The use of up to 30% white cement in place of the normal cement may be required to reduce the darker appearance of a patch. An interval of thirty minutes shall then elapse before a final surface tamping is given to the patch, after which the surface shall be treated to resemble the surrounding concrete as closely as possible. Board marks may be reproduced by striking a suitable piece of timber held against the plastic concrete. The patch shall be neat and workmanlike in appearance and after completion it shall be kept wet for a period of at least three days.

The cost of repairing any defective concrete shall be to the Contractors account.

The preparation, application and curing of the above repair materials shall all be in strict accordance with the Manufacturer's instructions.

Add the following Clause:

#### **PSG 5.5.16 Manhole Covers and Frames (New Sub-Clause)**

Add new Sub-Clause:

Manhole frames are to be set into the concrete with the upper edge 10mm above the concrete level to prevent the entry of rainwater.

All areas of damaged galvanised surfaces are to be repaired using a cold galvanising system ('Zinga' or similar approved) as per manufacturer's instruction.

#### **PSG 5.5.17 Rock Anchors and Threaded Anchor Bars**

Add the following Clause:

Where required, foundation dowels, pipe encasement dowels and anchor bars of specified material, diameter and length shall be installed at the positions and to the dimensions shown on the drawings or scheduled in the Bill of Quantities or as directed by the Employer's Agent. After exposing, cleaning and trimming the rock formation, holes with specified diameters and depths shall be drilled in the rock. After the holes have been cleared and prewetted, they shall be filled with 1-component, ready to mix, free flowing, low shrinkage expanding cementitious grout with a 7-day compressive strength of 80MPa.

A typical detail of the pipeline foundation dowels, reinforcement cage and concrete encasement is shown on the drawings.

All dowel bars shall be hot dipped galvanized to SANS 121 / ISO 1461.

All threaded anchor bars shall Grade 4.8 and hot dipped galvanized to SANS 121 / ISO 1461.

When the concrete is placed around the reinforcing steel, the reinforcing steel shall be clean, free from mud, oil, grease, paint, loose rust. Loose mill scale or any other substance which could have an adverse chemical effect on the steel or concrete, or which could reduce the bond.

## PSG 6 TOLERANCES

### PSG 6.2 PERMISSIBLE DEVIATIONS

#### PSG 6.2.3(a) *Replace with the Following:*

Description	Permissible Deviation in mm		
	Degree of accuracy		
	III	II	I
Spacing between two adjacent bars	± 25	± 20	± 15
Dimensional position of bar	± 20	± 10	± 10
Longitudinal location of bends and ends of bars	± 40	± 30	± 20
Cover to reinforcement	0 + 20	0 + 20	0 ± 20

## PSG 7 TESTS

### PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING

#### PSG 7.1.2 Frequency of Sampling

##### PSG 7.1.2.2 *Replace the Entire Contents of the Clause With:*

The Contractor shall provide the following number of sets of three standard metric 150mm metal cube moulds for the volume of concrete poured as per the table below:

**Table 4 - Frequency of compressive strength tests:**

Volume of pour (m <sup>3</sup> )	Number of sets
0 – 25	2
26 – 50	4
51 – 100	6
101 – 200	8
+ 201	10 (or as required by the Employer's Agent)

These sets of concrete cubes will be crushed when they are 7 and 28 days old.

Provide sufficient extra cube moulds for 3 days, 7 day, etc, crushing tests to be made as he so requires for their own purposes ie for shutter stripping, post-stressing cables.

Make and cure all cubes on site under the supervision of the Employer's Agent, in accordance with SANS Method 5863.

Be represented at the crushing test if he so wishes. Transport all cubes to the nominated laboratory between 7h30 and 11h00 on the last working day prior to the date of test. Only the results from this laboratory will be considered and will be the sole basis on which concrete is accepted or rejected.

**PSG 7.1.2.4** Delete this sub-clause

## **PSG 7.2 TESTING**

### **PSG 7.2.3 Laboratory Testing**

Add to the Sub-Clause:

All test cubes shall be made, cured and tested in accordance with the requirements of SANS Standard Method 5863 and 5864.

Test cubes shall be cured in an approved curing tank.

Delivery of cubes for testing shall take place not less than 24 hours in advance of the specified time for testing.

The Contractor shall keep accurate records of the exact position in the structure of the concrete batch represented by the cube test. All costs connected with sampling and testing of concrete, as described in this section of the project specification, shall be included in the relevant strength concrete rates.

## **PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE**

Delete the entire contents of G 7.3.1 and G 7.3.2 and replace with:

### **PSG 7.3.1**

The Contractor is hereby advised that the only basis, on which concrete strength will be accepted or rejected, is on the 28-day cube strength obtained from cubes crushed at the nominated laboratory. Unless the conditions of sampling, cube manufacture, cube curing and record keeping are strictly adhered to, the test results will be meaningless. To this end it is emphasised that the Contractor must strictly comply with all the concrete test methods specified in SANS Method 861.

**Table 5 - Acceptance criteria for concrete strength**

Acceptance Category	Strength $C_s$ = Average minimum strength for 3 cubes at 28 days (MPa)
Characteristic strength for water retaining structures	35
Full acceptance	$C_s \geq 37$
Conditional acceptable	$33 \leq C_s < 37$
Rejection	$C_s < 33$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

#### **Full acceptance**

Concrete shall be accepted unconditionally, subject to the concrete meeting the durability and cover criteria.

#### **Conditional acceptance**

Concrete shall be accepted with a warning that construction methods should be examined to improve the strength. A financial penalty of up to R75/m<sup>3</sup> will be applied on a pro rata sliding scale for all concrete poured where the average strength (for 3 cubes at 28 days) test results fall within the conditional acceptable range.

#### **Rejection**

At the discretion of the Employer's Agent, the concrete shall be removed and replaced at the expense of the Contractor.

#### **Core holes**

That test cores shall be drilled from the concrete and tested in accordance with the SANS Method 865 to determine the estimated actual strength and the estimated potential strength of the concrete.

If the results of the core tests show that the concrete meets the test requirements, the structure shall be accepted if the cores tests show that the concrete does not meet the strength requirements, an appropriate full-scale load test, as determined by the Employer's Agent, any be applied on the structure containing the defective concrete.

If load tests are, in the opinion of the Employer's Agent, impracticable, or where the portions of the structure subjected to such test fail to pass the test specified, he shall have the right to require strengthening or replacement of the portions of the structure concerned.

Upon removal of the core the hole is to be dampened and filled with a stiff mix of an expanding cementitious grout (Sika Grout G.P. or similar approved). Thereafter, an external slurry coat (0.25m x 0.25m) of a polymer modified cementitious coating (Sika Top-Seal 107 or similar approved) is to be applied over the exposed surface of the core hole.

### PSG 7.3.5. Replacement or Strengthening of Concrete

Delete after the words "the Contractor shall", and insert

"Make adjustments in order to meet the specified requirements."

Add:

### PSG 7.3.6. Table 6 - Acceptance Criteria for Concrete Cover

Acceptance Category	Concrete Cover (mm) (for specified cover of 50mm)
Full acceptance	$70 > C_d \geq 50$
Conditional acceptance	$45 \leq C_d < 50$
Acceptance with remedial measures	$40 \leq C_d < 45$
Rejection	$C_d < 40, C_d > 70$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

#### Full acceptance

Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and durability criteria.

#### Conditional acceptance

Concrete will be accepted with a warning that construction methods should be examined to improve the cover. A financial penalty of up to R15/m<sup>2</sup> will be applied on a pro rata sliding scale for each structural element where the average test results fall within the conditional acceptable range.

#### Acceptance with remedial

Concrete will be accepted if the Contractor measures undertakes remedial work at their expense, as approved by the Employer's Agent, to improve the durability of the concrete to the criterion described as "full acceptance",

#### Rejection

At the discretion of the Employer's Agent, the concrete shall be removed and replaced at the expense of the Contractor.

Notwithstanding Clause 7.6.3 of the General Condition of Contract (Removal of improper work and materials) and Clause 7.7.1 of GCC (Contractor to search), the onus will be on the Contractor to prove to the Employer's Agent the extent of the concrete for which the durability and cover values fall below the Specified Values (in the above tables), and the cost of this searching is to be included in the Contractor's rates for concrete.

An item has been included in the Schedule of Quantities for the making good of core holes as directed by the Employer's Agent.

Where the Employer's Agent or their representative has reason to doubt whether the concrete cover over the reinforcement is not in accordance with the requirements of clause PSG 5.1.3, the cover shall be tested with a cover meter. If necessary, the Employer's Agent or their representative shall then indicate to the contractor where he must expose the reinforcement to prove the depth of cover.

Add:

### **PSG 7.3.7 Costs of Tests**

The costs of all tests required by the Employer's Agent or their representative shall be borne by the Employer except that costs of tests as set out hereunder shall be borne by the contractor –

(a) preliminary tests on materials and of mix proportions;

(b) all tests as may be made necessary by reason of the provisions of clause SABS 1200 G 7.3.5;

(c) such tests, including concrete coring and load tests, as may in the opinion of the Employer's Agent be made necessary by failure on the part of the contractor to meet the requirements of this specification.

Add:

### **PSG 7.3.8 Durability Index Tests**

To ensure that the concrete has been placed, compacted and cured correctly, a number of tests will be carried out by a nominated laboratory on the concrete after curing has been completed ie 26 to 30 days after placing of the concrete.

1) A set of four 68mm diameter cores, 75mm in length will be drilled at each test location through the covercrete (being the concrete layer between the outermost layer of steel reinforcement and the exposed outer surface of the concrete element) from the constructed concrete element when the concrete has reached 28 days of age. A slice (30mm thick) will then be cut from the outer surface of this core such that the slice is representative of the middle layer of the covercrete (ie the middle layer being a 30mm thick slice of concrete, 15mm from the exposed outer surface extending in towards the reinforcement) and tested for:

- 1.1) water sorptivity,
- 1.2) oxygen permeability, and
- 1.3) chloride conductivity

The positions at which the cores will be extracted will be indicated by the Employer's Agent.

The oxygen permeability and chloride conductivity test procedures shall be carried out in accordance with SANS 3001-C03 – 2-2015 and SANS 3001-C03-4-2015 respectively.

The water sorptivity test procedure shall be carried out in accordance with the *Durability Index Testing Procedure Manual V4.2 (UCT) (2017)*, which can be obtained from the University of Cape Town's website at:

[http://www.uct.ac.za/sites/default/files/image\\_tool/images/333/Downloads/UCT-WITS DI Manual\\_2017 Ver 4.2 2017-07-14.pdf](http://www.uct.ac.za/sites/default/files/image_tool/images/333/Downloads/UCT-WITS_DI_Manual_2017_Ver_4.2_2017-07-14.pdf).

- 2) The depth of concrete cover achieved will be measured to ensure that the specified values have been achieved.

The cost of these tests will be borne by the Employer if the results are equal to or exceed the specified value. The Contractor will pay for the tests if the results fall below the conditional acceptance range.

**Table 7 - Acceptance criteria for durability testing structural element**

Acceptance Category	Oxygen permeability index (log scale)	Water sorptivity (mm h)	Chloride Conductivity
Full acceptance	$O_p \geq 9.15$	$W_s \leq 8$	$C_c \leq 0.75$
Conditional acceptance	$9.15 \geq O_p > 9.0$	$8 < W_s \leq 12$	$0.75 < C_c \leq 1.50$
Acceptance with remedial measures	$9.0 \geq O_p > 8.75$	$12 < W_s \leq 15$	$1.50 < C_c \leq 2.50$
Rejection	$O_p < 8.75$	$W_s > 15$	$C_c > 2.50$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

#### **Full acceptance**

Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and cover criteria.

#### **Conditional acceptance**

Concrete will be accepted with a warning that construction methods should be examined to improve the durability. A financial penalty of up to R75/m<sup>3</sup> will be applied on a pro rata sliding scale for each structural element where the average test results fall within the conditional acceptable range.

#### **Acceptance with remedial**

Concrete will be accepted if the Contractor measures undertakes remedial work at their expense, as approved by the Employer's Agent to improve the durability of the concrete to the criterion described as "full acceptance",

#### **Rejection**

At the discretion of the Employer's Agent, the concrete shall be removed and replaced at the expense of the Contractor.

Add:

### **PSG 7.3.9 Water Tightness Testing**

#### ***PSG 7.3.9.1 Water Tightness Testing and Disinfection for Reservoir***

Disinfection shall be carried out under the supervision of the Employer's Agent and the Employer and shall comply with Code of Practice for Disinfection of Potable Water Facilities. The Contractor shall keep the pipeline clean throughout the Contract by making use of end caps or other approved methods.

A hydraulic test shall be undertaken on the reservoir structure before backfilling and no backfilling will be permitted before this test and the acceptance of the structure for water tightness.

All interior surfaces of the reservoir shall be broomed, cleaned and hosed down and the cleaning water run to waste.

The reservoir shall then be filled slowly at a rate not exceeding 2m in 24 hours and allowed to stand for 7 days to allow absorption to take place. The Contractor shall allow for adding chemicals to sterilize the reservoir.

The water level will be taken thereafter every 24 hours for 7 days. A maximum drop in surface level of 10mm will be permitted over the full period of 7 days. Should the structure not stand this test the Employer's Agent may order a second test, and should this fail, the Contractor shall be responsible for finding the leaks and taking such measures as necessary and approved by the Employer's Agent to produce a satisfactory test.

**Water for testing and disinfection shall be metered.**

Water for the second and subsequent tests will be charged to the Contractor at current tariff rates.

The lump sum price for the hydraulic testing of the reservoir shall for cleaning all internal surfaces, adding chemicals and testing.

### **PSG 7.3.9.2 Water Tightness Testing for Roof Slab**

Water tightness testing of the concrete roof / reservoir roof shall be undertaken upon completion, before filling of the reservoir, by flooding the roof and maintaining a minimum depth of 100mm for 72 hours.

If at any time during the water tightness test the roof shows any sign of water leakage or visible dampness on the soffit or perimeter walls it shall be deemed defective. Defective works shall be dealt with in accordance with the requirements of G 5.5.14, as amended.

### ***PSG 7.3.9.3 Water Tightness Test for Chambers and Buildings***

Add new Sub-clause:

All reinforced concrete chambers and buildings shall be constructed watertight with bituminous sealing 1-part polyurethane hydrophilic sealant which swells when in contact with water to seal all types of construction joints and penetrations in concrete and 150mm wide self-adhesive bituminous tape suitable for buried conditions on external face of construction joints.

On completion of each concrete valve chamber, and prior to completion of the backfilling around the chamber, a water tightness test shall be undertaken by the Contractor. This shall be carried out for 24 hours with continuously maintaining the chamber excavation working space periphery to ground level full of water for at least 4 hours. Should there be any noticeable leaks into the chamber, the Contractor shall carry out at their own expense whatever measures are necessary to waterproof the chamber to the Employer's Agent's satisfaction. On completion of successful water tightness test for the chamber, the Contractor shall dewater the excavation before backfilling around the chamber.

## **PSG 8 MEASUREMENT AND PAYMENT**

### **PSG 8.1 MEASUREMENT AND RATES**

#### **PSG 8.1.2 Reinforcement**

Add the following to Sub-Clause:

In addition to the requirements of SANS 1200G the Contractor shall allow in their rates for curving bars to required radius, where required.



**PSG 8.1.2.2(a) Reinforcement**

Delete the second paragraph and substitute with:

The quantities (or percentages) of all other sizes of steel bars that are scheduled may be subject to variations and the contract prices for these will be fixed regardless of the magnitude of such variations (if any).

**PSG 8.1.3.1(b) Overbreak**

Delete the Sub-Clause and substitute with:

The scheduled rate for overbreak in rock excavation to structures shall include, inter alia, for the excavation of material, cleaning, washing and brushing with grout and for refilling with Grade 20/19 concrete together with all necessary shuttering and including the additional thickness of 50mm to the concrete in lieu of blinding on horizontal floors.

The Contractor is to make their own estimate of the extent of overbreak where no overbreak allowance has been allowed for. The Contractor will not be paid for overbreak in intermediate or soft material.

**PSG 8.2 SCHEDULED FORMWORK ITEMS****PSG 8.2.2 Smooth**

Add to Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>) or number off (No.)

**PSG 8.2.6 Box Out Holes/Form Voids**

Add to Sub-Clause:

e) Large, circular, of diameter greater than 0.7m up to 1.0m Unit: No.

Depths as in (a) above.

**PSG 8.4 SCHEDULED CONCRETE ITEMS****PSG 8.4.7 Curing and Protection**

Add new Sub Clause:

The unit of measurement shall be as follows:

t) Reservoir Floor Slab	Unit: m <sup>2</sup>
u) Reservoir Walls	Unit: m <sup>2</sup>
v) Top surface of the reservoir roof slab	Unit: m <sup>2</sup>
w) Soffit of the reservoir roof slab	Unit: m <sup>2</sup>
x) Reservoir Columns	Unit: No.

The tendered rates shall include full compensation for the supply of all labour, plant and materials to ensure that all concrete shall be protected from contamination and loss of moisture by one or more of the curing and protection methods set out in Clause 5.5.8.

**PSG 8.4.8 Concrete Complete with Formwork – Access Driveways, Precast Slabs and Other Minor Concrete Slabs**

Add new Sub-Clause:

Separate items, where so required, have been included in the Bill of Quantities for concrete complete with formwork for each particular grade of concrete or for structural units of similar size and shape, or for both.



The unit rates shall cover the cost of fixing the steel, the provision of concrete, mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, forming of holes where required, encasements for ventilation pipes, striking off or levelling as applicable, and curing and repairing where necessary, together with the cost of all parts of formwork in contact with the concrete and the necessary bearers, struts, and other supports, the provision of the required surface finish plus the layout and plant necessary to erect and strike such formwork.

The rate shall include for the casting into the concrete, of pipe work for breather pipes, security manhole covers or whatever is required in terms of the drawings for same. The rate shall include for the placing onto position of precast slabs where applicable.

Unit: m<sup>3</sup>

## **PSG 8.9 GROUTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS**

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the grouting of pipes and specials through box-outs or broken out openings in walls or slabs. The rates shall include for all necessary labour, plant and materials required to carry out the work described in PSG 5.5.13 and for finishing to the required quality. Quantities specified by size of pipe.

Unit: No.

## **PSG 8.10 CASTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS**

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the casting of pipes or specials through walls or slabs. The rates shall include for all labour, plant and materials to make the necessary modifications to formwork to allow the pipe or special to be cast in, the positioning of the pipe or special and for finishing the concrete surface to the required quality around the pipe or special at the end of the concreting operation.

Unit: No.

## **PSG 8.11 GROUTING STEEL PIPE INSIDE CONCRETE JACKED SLEEVE**

Add new Sub-Clause:

The rate shall include for the supply, mixing and application of the grout as per the relevant drawings, prevention of the steel pipe from floating and the curing of the grout, inclusive of the sealing off of the voids to be grouted.

Unit: m<sup>3</sup>

## **PSG 8.12 MISCELLANEOUS WORK OTHER THAN METAL WORK**

Separate items will be scheduled for each type of miscellaneous work.

The tendered rates shall include full compensation for providing all labour, materials and equipment required to carry out the work, for all preparatory work, for constructing the work scheduled in a workmanlike manner and for finishing-off and cleaning up when the work has been completed.

Unit: as scheduled

## **PSG 8.13 CONCRETE RETAINING BLOCK WALLING**

Add new Sub-Clause:

The unit of measure shall be the square metre of walling measured vertically from the top of the foundation to the top of the wall.

The rate is to include for the supply and placing of the specified block type and size including the construction of the concrete base, compaction of the fill placed in and 300mm behind the blocks. The rate to include for all plant, labour, materials and incidentals necessary to carry out the work.

The tendered rates shall include for the engineering design by the supplier as well as the issuing of an engineering certificate of approval by the Contractor, to the Employer's Agent.  
Unit: m<sup>2</sup>

## **PSG 8.14 ROCK ANCHORS**

### **PSG 8.14.1 Drilling of Dowel Bars (Foundation and Pipe Encasement) and Threaded Anchor Bar Holes**

Add new Sub-Clause:

The unit of measurement shall be number (No.) of per depth per foundation dowel/ anchor diameter size as stipulated in the Bill of Quantities and/ or shown on the drawings.

The tendered rates shall include for full compensation for drilling, clearing and cleaning the holes as specified.

### **PSG 8.14.2 Dowel Bars (Foundation and Pipe Encasement)**

Add new Sub-Clause:

The unit of measurement for the dowel bars shall be the tonnes (t) of bars provided and secured in position.

The dowel bars type shall be hot dipped galvanized with diameter, length and type of grout shall be shown on drawings or stipulated in the Bill of Quantities

The tendered rates shall include for full compensation for supplying all material, bending to the required shape codes, cutting and bending on site to suit site conditions and cover requirements, positioning and grouting the dowel bars as specified in the Bill of Quantities and/or drawings.

### **PSG 8.14.3 Threaded Anchor Bars**

Add new Sub-Clause:

The unit of measurement for the threaded anchor bars shall be the number (No.) of bars provided and secured in position.

The threaded anchor bars type shall be hot dipped galvanized with diameter, length and type of grout shall be shown on drawings or stipulated in the Bill of Quantities.

The tendered rates shall include for full compensation for supplying all material, cutting and position and grouting the dowel bars as specified in the Bill of Quantities and/or drawings.  
Unit: No.

## **PSG 8.15 PRESSURE GROUTING**

Add new Sub-Clause:

The unit of measurement for grouting shall be the kilogram of cement or propriety make of grout as may be applicable used in the grouting operation.

The grout type and for which purpose it is required is shown on drawings and/or stipulated in the Bill of Quantities.

The tendered rates shall include for full compensation for providing the equipment and all material, mixing and pumping the grout into the prepared holes in accordance with the instructions of the Employer's Agent and for the water pressure tests.

Unit: kg

**PSHA            STRUCTURAL STEELWORK – SUNDRY ITEMS (SABS 1200 HA – 1990)**

**PSHA 3        MATERIALS**

**PSHA 3.1      STRUCTURAL STEEL**

The steel shall be Grade 300W for hot rolled steel sections (I, H, C, L). All members shall carry the Grade 300W steel symbol to identify steel grade prior to manufacturing.

All other structural elements, tubular profiles, flat bars, squares, rounds, checker (“vastrap”) floor plate shall be Grade 43 or as specified on the drawings. The thickness of a checker (“vastrap”) floor plate, is the under-pattern thickness.

**PSHA 5        CONSTRUCTION**

**PSHA 5.1      DRAWINGS AND SHOP DETAILS**

**PSHA 5.1.2    Contractor to Provide Shop Details**

Add to the Sub-Clause:

The Contractor shall prepare their own shop details based on the dimensions and details given on the drawings and will be required to submit their shop details to the Employer's Agent at least 3 weeks prior to fabrication. Written consent must be obtained from the Employer's Agent, prior to commencing fabrication. The Contractor is still responsible for ensuring that the shop details are dimensionally correct.

**PSHA 5.2.10   Protective Treatment**

Add to the Sub-Clause:

All mild steel shall be heavy duty hot dip galvanised except where shown to the contrary on the drawings or in the schedule of quantities. Hot-dip galvanising shall conform to SANS 121 / ISO 1461 for heavy duty coatings or equivalent.

Screwed and socketed tubing shall be galvanised in compliance with BS 1387. Galvanised, malleable cast iron fittings shall comply with SANS 14.

All paint shall be delivered at the workshop as well as on the site in the original containers that display the manufacturer's name and trademark as well as the SABS mark. The Employer's Agent may, at their discretion, prescribe the manufacturer and the type of paint.

The coating system shall be from one manufacturer only. The paint manufacturer's instructions shall be strictly adhered to.

Surfaces in contact with each other after assembly or erection shall receive the primer beforehand, except for faying surfaces for friction-grip fasteners.

The application of the final coats of paint before erection will be permitted by the Employer's Agent only in special circumstances or where specified elsewhere.

After erection of the steelwork, the specified paint system shall be reinstated in all areas where it has been damaged. All fasteners shall also be treated in accordance with the specified paint system.

No painting on the site shall be done in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surface to be painted.

No painting shall be done if the temperature falls below 7°C.

Welded seams shall be thoroughly steel brushed before painting. Permission shall be obtained from the Employer's Agent before slag residue may be neutralized with acids or alkalis.

### Surface preparation in the workshop

SIS 05 59 00 or ISO 8501 shall apply and shall be referred to in respect of this clause.

### Manual scraping and wire brushing

This treatment shall normally be applied in all circumstances except if and where blast cleaning is specified.

- Prior to treatment, the steel surface shall be cleaned of dirt and grease.
- Heavier layers of rust shall be removed by chipping.
- All loose mill scale, rust and foreign matter shall be removed by very thorough scraping, wire-brushing, machine-brushing, grinding, etc.
- Finally, the surface shall be cleaned by vacuum cleaner, with clean dry compressed air, or with a clean brush.
- The surface shall have a pronounced metallic sheen with an appearance equal to or better than that shown on the prints designated ST 3 in SIS 05 59 00 or ISO 8501.

### Blast-cleaning

This treatment may be used but is not obligatory unless so specified hereinafter. If blast cleaning is preferred to normal scraping and wire brushing, the final surface shall be equal to or better than that specified in sub sub-clause 3.1.2.1.

### Paint system

The paint system shall be applied in accordance with the specifications given in table 3.1 below. Application may be by brush, roller or sprayed. Red lead may not be used.

All structural steel which is not visible, e.g. purlins, rafters and trusses, shall receive only the primer coat. All visible steel shall receive the full appropriate paint system treatment.

In all cases the manufacturer's specification for any paint product must be followed.

Paint system for new steel surfaces for unpolluted inland environments (not suitable for temperatures above 90 °C):

Coat No	Place of application	Time of application	Min thickness in $\mu\text{m}$	Types	SABS-Specification
1. Primer	Workshop	Within 4 hours of surface treatment	50	Zinc phosphate Plascopeprime 182 QD (Plascon) or D193-1029 (Dulux)	(None)
2. Two final coats; colour as specified elsewhere	Site	After erection. 2nd coat within 48 hours of 1st	Each coat 25 to 40	High-gloss enamel or structural steel paint	630 Type I 684 Type A

### Paint system for newly galvanized surfaces:

#### Recommended surface preparation:

- Degrease with Plascon Aquasole Degreaser GR 1 or similar approved. Any cement or foreign material must also be removed from the metal surface.
- Rinse with clean running water while protecting the floors and walls.
- Wash with Galvanised Iron Cleaner GIC 1 by Plascon, or similar approved.
- Rinse with clean running water and allow to dry. Protect the floors and walls.

Apply one coat of Plascon Aquafast Etch Primer no EMS 18 or similar approved to a total dry thickness of 35 microns. Must be overcoated within 72 hours to avoid excessive hardening.

Two final coats as specified in table 3.1

#### **HOT DIPPED GALVANIZING (See also subclause 5.9 in SABS 1200H)**

Steelwork described as “hot dipped galvanised” shall be galvanised after manufacturing and before delivering to site by means of the hot dipped process complying with the minimum requirements of SANS 121 / ISO 1461 (latest amendment). Structural steel members shall be given an 85-micron thick galvanised coating, or such other thickness as may be specified in accordance with SANS 121 / ISO 1461. (Table 1)

Damaged surfaces must be thoroughly cleaned and if welding has been carried out all slag must be removed preferably by the use of a chisel hammer.

Before galvanising all surfaces of the metalwork shall be thoroughly cleaned of all scale and rust by shot blasting in accordance with SANS 064 or by pickling and then fluxed ready for galvanising.

The zinc coating shall be even and continuous over all surfaces, free of bare spots, dull or rough patches, blisters or other imperfections. The zinc coating shall show no signs of peeling and shall be uniform in thickness.

All M8 and greater bolts, nuts, screws and other threaded components, shall be hot dip galvanised to SANS 121 / ISO 1461 (previously articles type C).

#### **Repairing of damaged coatings**

##### **Plant repairs**

Should any black spots or uncoated areas greater than 5mm<sup>2</sup> (individual) or 25mm<sup>2</sup> (collective) per m<sup>2</sup> or per m run be present after galvanizing, the coating shall be repaired. This is to be carried out using abrasive blasting followed by zinc metal spray. The zinc metal spray shall be applied at least 25% thicker than that specified and shall overlap the damaged area by 20mm to 25mm. The finished coating shall be wire brushed to remove any excess metal spray.

Hot patch soldering is an alternative at the plant but is seldomly used, as the method needs to be conducted while the product is still hot before quenching.

##### **Site Repairs**

Zinc metal spray as set out above.

The recommended alternative is to use a zinc rich paint provided it has at least 90% zinc in the dry film, by mass. The paint should be a zinc rich epoxy in conformance with SABS 926. A single pack zinc rich paint such as Plascon's “Plascozinc Polygalv Primer” or equal can be applied.

#### **PSHA 5.2.11 Pipe Clamps and Brackets (New Sub-Clause)**

Add new Sub-Clause:

Clamps and brackets around pipes are to be constructed to the details shown on the drawings and are to be provided with all necessary bolts for fixing to concrete.

#### **PSHA 5.3.6 Grouting**

Add to the Sub-Clause:

The Contractor will be fully responsible for all grouting work under this Contract.

**PSHA 6 TOLERANCES****PSHA 6.2 TOLERANCES ON DIMENSIONS, ACCURACY OF ERECTION, ETC****PSHA 6.2.2 Other Tolerances**

Add to the Sub-Clause:

The accuracy of erection shall be the degree of accuracy II as tabulated but amended as follows:

In items d(1) and d(2) of the table the Degree of Accuracy given as "±5" shall be read as "±3".

**PSHA 7 TESTING****PSHA 7.1 TEST CERTIFICATES**

Delete the part sentence "in terms of the project specification" from the wording of the Sub-Clause and add the words "when so requested by the former" at the end of the sentence. The Employer's Agent shall be afforded the opportunity to inspect shop manufactured steel works at the factory.

**PSHA 8 MEASUREMENT AND PAYMENT****PSHA 8.3 SCHEDULED ITEMS**

Add the following introduction to the subsequent Sub-Clauses:

The tendered rates shall cover the cost of preparing shop details (where applicable), the supply of all materials, fabrication, process control, loading, transporting to Site, off-loading, erection (unless separately included), setting into concrete or brickwork and grouting in. They shall also include for the supply of all nuts, bolts, holding down bolts, washers, rivets, cutting to waste, all temporary bracing, templates and shuttering necessary for installing, transporting and erecting.

Where the scheduled items for steelwork include corrosion protection, then the price stated shall also include for such protection as specified in SABS 1200HC. Similarly, the materials and corrosion protection for nuts, bolts, washers etc. shall match the steelwork ordered.

Where the requirements of the above introduction conflict with the requirements of Sub-Clauses 8.3.1 to 8.3.6 inclusive the requirements of the introduction shall take precedence.

**PSHA 8.3.3 Ladders, Complete and Installed**

Add to Sub Clause:

The rate shall cover the cost of supplying all materials as scheduled in the bill of quantities for each ladder, safety cage including stringers, rungs, lugs or other means of chemical fixing to walls with stainless steel anchors, floors, etc., as shown on the drawings, and fabricating, installing and grouting in.

The rate shall cover the cost of supplying ladders and safety cages to required lengths.

Unit: m or No.

**PSHA 8.3.4 Flooring, Complete and Installed with Frames**

Add to Sub Clause:

The unit of measurement shall be Sum or m<sup>2</sup> or No. or m.

**PSL MEDIUM PRESSURE PIPELINES (SABS 1200 L – 1983)**

(Applicable to SABS 1200 L – 1983)

NOTE: Any specification under these amended specifications which are in conflict with the eThekweni Water and Sanitation Standard particular specification, shall see the amended specification taking preference.

### **PSL 3 MATERIALS**

#### **PSL 3.1.1 Materials Control (New Sub-Clause)**

Add new Sub-Clause:

##### **PSL 3.1.1.1 Checking material lists and drawings (New sub-clause)**

Add new Sub-Clause:

Not more than 4 weeks after the contract has been awarded, the Contractor shall check the Materials Lists against the drawings and advise the Engineer in writing of any shortages or omitted items. This applies to free issue items, if issued.

If any variations in the contract is authorized, the Contractor shall ensure that any additional items to be supplied by the Employer and the Contractor, are ordered in good time so as not to cause delay to the works.

The Contractor shall check the delivery timing of all pipe and fittings and ensure that it is in line with the Contract programme. Any critical items that could be delivered late are to be brought to the attention of the Engineer.

The delivery status of materials is to be checked and followed up upon by the Contractor throughout the contract.

##### **PSL 3.1.1.2 Materials control – general (New sub-clause)**

Add new Sub-Clause:

The Contractor is held responsible for the inspection and control on site of all the pipe supplied as free issue materials for the duration of the contract. Once pipe material and equipment has been accepted, any subsequent damage shall be made good to the satisfaction of the Engineer at the expense of the Contractor. Damage to internal linings and external coatings that are necessary and incidental to good welding practices and the manufacturing of pipe specials are excluded.

Any item damaged beyond repair shall, at the discretion of the Engineer, either be replaced at the Contractors expense or the value of the asset reimbursed in full to the Employer.

##### **PSL 3.1.1.3 Material storage (New sub-clause)**

Add new Sub-Clause:

The Contractor shall store all items to be incorporated into the Works so that no damage occurs whilst awaiting installation. Where practical, items are to be stored in containers for protection from the weather and pilferage.

All piping, pipe fittings, and equipment stored outside or awaiting installation are to be protected from the weather and storm water and soil wash, using plastic sheeting that is highly UV resistant and storing same on pre prepared concrete surfaces. Pipes taken over from the Employer shall receive the required attention in order to ensure safe storage in yards, protected from fires, vandalism and incidental damage that can reasonably be prevented.



**PSL 3.1.1.4 Handling pipe, fittings and equipment (New sub-clause)**

Add new Sub-Clause:

Strict supervision shall be maintained by the Contractor at all times when handling pipes and equipment. Pipe is to be lifted with a lifting beam and slings which shall be fitted at quarter points around the pipe. Due care shall be taken when fitting and placing slings to ensure that ancillary items do not get crushed during lifting. Pipe coating is to be protected by padding or otherwise from scuffing damage during lifting.

The equipment utilized for lifting pipes, must be approved by the Engineer for the purpose of ensuring that the lifting equipment is appropriate and will not damage the pipe coating. It is not allowed to handle pipes with chains or any other device involving metal contact with the pipe coating.

The Contractor shall ensure that all lifting equipment complies with the relevant safety regulations.

**PSL 3.1.1.5 Stacking of pipes and pipe spools (New sub-clause)**

Add new Sub-Clause:

The Contractor shall take due care when stacking pipe or pipe spools at the workplace. Pipes must never be placed directly on the ground but shall be stacked on dunnage according to approved methods and shall be separated from one another with the use of applicable methods approved by the Engineer.

Should the Contractor wish to use tyres as dunnage, all tyres shall be removed from site upon completion of the Works or upon completion of work at a specific location where tyres were utilized.

**PSL 3.1.1.6 Segregation of special items (New sub-clause)**

Add new Sub-Clause:

All items/equipment which are to be used as paired items shall be marked as "special items" by the Contractor. Examples of this are valve mating flanges, flat faced flanges, etc. The Contractor shall take special care when storing items that are marked, "special items", in order to ensure that they are not utilized by mistake as bulk items.

**PSL 3.1.1.7 Controlled issue of lined pipe (New sub-clause)**

Add new Sub-Clause:

The Contractor shall establish a data base of free issue and or procured pipe material which will reflect each and every pipe number of pipe lengths under his control, together with the pipe data of each of the pipes, next to the pipe number. The pipe data will clearly indicate the grade of steel and the wall thickness for each pipe number. Any lengths of pipe or piece of pipe cut from a full length, shall be able to be traced to original manufacturing data, at all times.

The Contractor shall control the issue of lined pipe using cutting lists, in order to minimize scrap metal and avoid unnecessary field butts. The Contractor shall ensure that pipe identification marks are transferred in a controlled manner onto cut sections of pipe to ensure 100% future traceability. The cutting of pipes and the transferring of identification marks shall be carried out under the close supervision of the Contractor's Quality Control Officer. The Contractor shall, at any stage as required by the Engineer, produce the pipe



data base on site in order for the Engineer to verify the origin of section of pipe built into pipe specials.

The Contractor's rates for compliance with his obligations in terms of quality control shall be deemed to include for the establishment of the required data base and the control of pipe material on site.

The Contractor shall take note that any cutting of standard length of pipe, for the purpose of making the pipe more manageable in restricted areas, will not be compensated for by payment for additional field joints.

Free issue pipe, if any, shall be utilized optimally to reduce waste. Any pipe damage, to a point that the pipe length requires rejection for use, as a result of the Contractor manhandling pipe inappropriately, shall be noted and the Employer shall require financial compensation to the equivalent value of the asset value. The resultant scrapped pipe shall be removed from site at the Contractor's cost.

**PSL 3.1.1.8 Scrap material (New sub-clause)**

Add new Sub-Clause:

Scrap metal from free issue pipe where applicable, shall be sold to scrap dealers at the best rate obtainable and the income generated from these sales shall be refunded to the Employer where such refund shall be consolidated in the following payment certificate, shown as a deduction. A consolidated summary sheet shall be added to the payment certificate for this purpose.

**PSL 3.1.1.9 Employer supplied and contractor supplied material control (New sub-clause)**

Add new Sub-Clause:

All materials must be checked and listed against their respective material and test certificates, to ensure that such materials can be readily identified and traced to its material certificates and listings.

**PSL 3.1.1.10 Cleaning of inside of pipe supplied by the Employer (New sub-clause)**

Add new Sub Clause:

The Contractor shall, upon instruction of the Engineer, clean the internal surface of pipe before incorporation of the Works. This might be required as a result of the duration of the pipe laid in the pipe yard before use.

**PSL 3.1.1.11 Acceptance of pipes, fittings and materials – free issue materials (if applicable) (New sub-clause)**

Add new Sub-Clause:

Before acceptance of any pipes, fittings or other items of equipment issued as free issue materials ( where applicable), the Contractor is to carry out a thorough inspection to ensure that the materials have been delivered undamaged and are as ordered.

Pipes shall be checked for:

- Identification
- Certification
- Soundness of internal lining
- Ends beveled correctly
- Circumference according to specification and within tolerance
- Quantity agrees with advice note

Inspection of pipe fittings, valves and other equipment shall include but is not limited to:

- Identification
- Certification
- Material, schedule and rating
- Lining where specified
- Coating where specified
- Circumference according to specification and tolerance
- Damage to items - example flange faces

Defective items shall not be accepted, but marked, quarantined and immediately reported to the Engineer.

If accepted, the Contractor shall take the required steps to ensure that all delivery documentation together with signed acceptance notes is filed in the construction dossier

## **PSL 3.4 STEEL PIPES, FITTINGS AND SPECIALS**

### **PSL 3.4.1 General**

Add the following to L 3.4.1:

Steel pipes, fittings, flanges and specials shall be coated and lined in accordance the lining or coating systems approved by eThekwin Water and Sanitation as detailed in the Linings and Coatings Particular Specification.

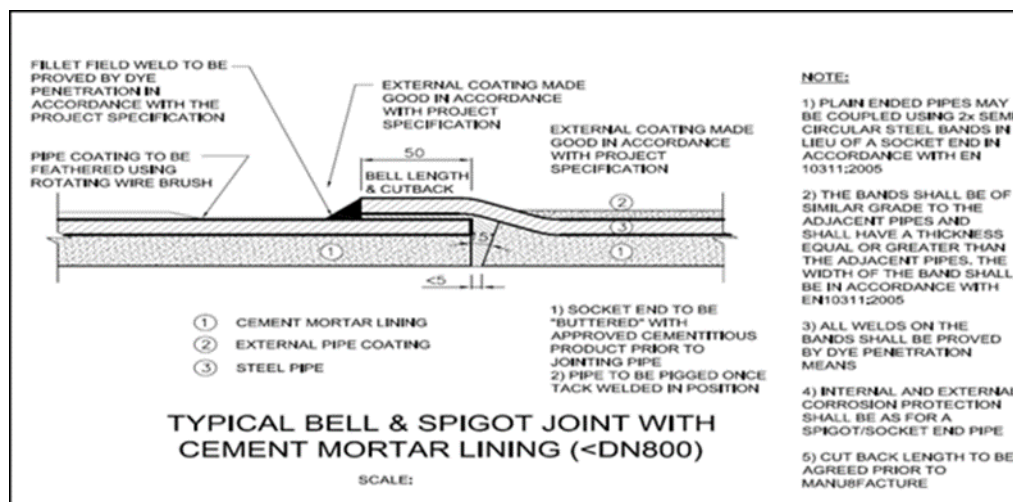
Steel pipes less than DN600 to be supplied by the Contractor shall be:

- grade X42, 4.5mm thick spigot and socket pipe plain ended on the non bell side for fillet welding at the bell when jointing
- Three-Layer Polyethylene (3LPE) coated on the outside, pipe coating system 4 (PCS 4) as per eThekwin Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13
- Cement mortar lined internally, pipe lining system 2 (PCS 2) as per eThekwin Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13

All steel pipe shall comply with the requirements of the particular specification attached hereto and named: eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13.

Pipe lengths shall be as scheduled in the Bill of Quantities.

Where a bell and spigot is specified, this shall comply with Figure below.



Steel fittings and specials to be grade X42 coated and lined to project specifications. Plate thickness shall not be less than 4.5mm, or the thickness that results in a working stress not exceeding 75% of the allowable maximum working stress for the steel grade.

For all branch connections the plate thickness of the barrel and branch shall be such that the maximum stress shall not be greater than that for an uncut pipe of the theoretical minimum thickness. Where it is more economical to provide external reinforcement in the form of collar type rings or crotch plates, these forms of reinforcement shall be used to achieve the same results

General handling of pipe needs to be such that pipe material will not be stressed and pipe lining and coating shall not be damaged.

#### PSL 3.4.2 Pipes of Nominal bore up to 150 mm

Delete the Sub-Clause.

#### PSL 3.4.3 Pipes of Nominal Bore over 150 mm

Delete the Sub-Clause.

#### PSL 3.4.4 Fittings And Specials

Add to the Sub-Clause:

- The lining and wrapping of specials, which are to be butt-welded, is to be terminated 100mm from the end of the pipe. The lining of specials which are to be sleeve welded shall be taken to the end of the pipe and the wrapping is to be terminated 100 mm from the end. On flanged specials the wrapping and lining is to be taken to the end of the pipe.
- Collars/bands shall be welded on to one or both ends of the bend, fitting or special for pipelines equal to or less than DN600 to accommodate the non-

belled end of a pipe. The collars/ bands shall have a minimum width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes. The collars shall provide an insertion distance the same as that of the connecting belled ended pipe. This will not apply where ends are to be jointed with adaptor joints.

- Square, plain faced ends where slip-on flanges are to be welded to the special
- All specials shall be protected in accordance with clauses PSL 3.9.8. All electrodes used for welding of joints shall comply with the relevant SANS standard.
- Tee pieces shall be fabricated in accordance with Table 9 of BS 534 (1990). All other specials shall be fabricated in accordance with the relevant clauses of BS 534 (1990).
- All even curvature bends shall be long radius and fittings for diameters up to and including DN200 shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings.
- All reducers to be cast reducers and shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings. Any fabricated reducers shall be fabricated based on the formula: Face to Face length =  $(D-d)*4$  where "D" is pipeline diameter and "d" is the diameter of the water meter and shall not have more than two longitudinal weld seams.
- Direction changes with bell ended pipe can be effected with a maximum deflection angle of 5 degrees. A direction change in the bell of a bell ended pipe will be treated as a straight joint and payment will be effected for such a direction change.
- All steel bends, fittings and specials shall be fabricated to the dimensions and details shown on the drawings and/or described in the Bill of Quantities.
- The bend, fitting, and special fabricator shall supply written confirmation that all hand welding was carried out by coded welders against appropriate welding procedures.
- Bends, fittings, and specials DN300 and larger shall have the internal lining and external coating made continuous ("made good") as specified elsewhere for welded joints on coated and lined pipes.
- Bends, fittings and specials shall be manufactured and tested in accordance with the specification for straight pipe and additionally with Section 18 of BS 534. The nominal dimensions of each bend, fitting and special required are itemized in the Bill of Quantities and/or on the drawings and 'exact length' tolerances shall be adhered to.
- Bends shall generally be of the segmented (gusseted) type except where otherwise stated or shown on the drawings or where the Tenderer can offer a price advantage for supplying even curvature bends.

#### **PSL 3.4.4.1 Flanges:**

Add new Sub-Clause:

Use SANS 1123: 2007, Table 3 only. Where SANS 1123: 2007 (Table 3, for the different pressure classes) does not provide specifications for a particular diameter and class of flange, then specify BS EN 1092.

### PSL 3.4.4.2 Segmented Bends

Add new Sub-Clause:

This clause applies to segmented bends equal to or greater than 300 mm in diameter. All segmented bends shall be fabricated in accordance with the criteria in Table 7.

For deflection angles up to and including 9 degrees, bends may be fabricated from pipe lengths "on site" in accordance with the Table below.

Deflection of Angle	
Up to and including 3 °	One pipe end scarfed on site
Exceeding 3 ° and up to and including 9 °	Mitre cut (two pipe ends scarfed on site)

Bends greater than 9° shall be fabricated at an approved pipe fabrication shop in accordance with the requirements of clause 21 of BS534:1990. Bends greater than 90° shall be fabricated from combinations of items from Table 7.

Shop drawings of bends, fittings and specials shall be submitted to the Engineer for approval prior to manufacture.

All flanged bends, fittings and specials shall be hydraulically tested at the fabricator's premises to the same pressure that they will be subjected to during the hydraulic testing of the completed pipeline. No visible signs of leakage will be permitted.

All segmented bends shall be fabricated in accordance with the criteria in Table 7.

**Table 7:**

Total deflection angle	Number of segments	Number of Welds	Number of scarf cuts
0 to 3 degrees	N/A	1	1
Greater than 3, equal or less than 9	N/A	1	2
Greater than 9, equal of less than 15	2	1	0
Greater than 15, equal or less than 30	3	2	0
Greater than 30, equal or less than 45	4	3	0
Greater than 45, equal or less than 60	5	4	0
Greater than 60, equal or less than 75	6	5	0
Greater than 75, equal or less than 90	7	6	0

The pipe manufacturer shall obtain and make available to the Employer's Agent a certificate or certificates from the steel manufacturer covering all steel used, showing by which process the steel was made and giving the chemical analysis of the steel and its physical properties. A record shall be kept of pipe serial numbers and the cast numbers of the steel used.

**PSL 3.4.5 Puddle Collars And Anchoring Flanges (New Sub-Clause)**

Add new Sub-Clause:

Puddle collars and anchoring flanges used as pipe anchorages shall be of the same diameter and thickness as the end flanges and shall be undrilled unless otherwise shown on the drawings. The anchoring collar/flange shall be capable of transmitting a longitudinal force 33% greater than the internal hydraulic pressure to be applied when testing, multiplied by the area of the bore and, under that condition, the stress in the material shall not exceed its yield stress.

The minimum distance of puddle flanges from reinforcement bars is 100mm to ensure that there is no current leakage between reinforcement and puddle flanges where cathodic protection systems are installed.

**PSL 3.4.6 Pipe material (New sub-clause)**

Add new Sub-Clause:

The Employer does not provide free issue pipe materials. Pipe supplied needs to comply with the requirements of the particular specification attached hereto and named: eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13.

**PSL 3.4.6 Pipe Material (New Sub-Clause)**

Add new Sub-Clause:

The Employer does not provide free issue pipe materials.

Pipe supplied needs to comply with the requirements of the particular specification attached hereto.

**PSL 3.7 Ovality of pipe (New Sub-Clause)**

Add new Sub-Clause:

It is the Contractors responsibility to ensure that the ovality of the large diameter slender pipe remains within specified limits during construction. The maximum deflection of any of the pipe DN1000 and larger, shall not be more than 5.0% of DN, once all backfilling has been completed in accordance with this specification. For the cement mortar lined pipe the deflection shall be limited to 2.0%.

Should it be required, the Contractor shall utilise spiders of approved type and design to support the pipe during backfilling, in order to ensure that the pipe does not deform outside the specification tolerances and also ensuring that the internal lining of the pipe is not damaged..

**PSL 3.8 JOINTING MATERIALS****PSL 3.8.1 Ac Pipes**

Replace Sub-Clause with the following:

Fibre Cement and concrete pipes

Jointing methods applied shall conform with the supplier/manufacturer's requirements

## PSL3.8.2 Flexible couplings

Delete the Sub-Clause and substitute the following:

Where ordered, steel flexible couplings are to be of the "Viking Johnson"/"Klamflex"/"Aqualok" or similar approved type without central registers, each comprising one center collar, two special flanges, two rubber rings and hot dipped galvanized mild steel bolts. Steel couplings shall be assembled strictly in accordance with the manufacturer's instructions and all bolts shall be torqued to the value recommended by the manufacturer. On completion of hydraulic pressure testing of the installation, the entire joint shall be protected as described in the particular clauses for corrosion protection.

The tendered prices for laying and jointing are to include for the supply of all necessary materials, plant and labour to complete the joint.

Add the following as L 3.8.2:

Flexible couplings shall conform generally to Clause 15 of BS 534 for slip-on type couplings and shall be of approved manufacture, manufactured from rolled steel, and fitted with rubber rings suitable for jointing plain-ended pipes. They shall be capable of being tightened and released without damaging or improperly distorting the rubber seating rings and shall be designed to prevent the rubber rings being blown out under pressure or sucked in under vacuum.

The rubber jointing rings shall be manufactured from first grade natural rubber to B.S. 2494 Class D. All bolts and nuts shall comply with SABS 135 or SABS. 136. Each sleeve shall be fitted with a centre register unless stated otherwise in the Project Specification.

Each coupling shall permit a repeated movement of 10 mm to cater for thermal expansion and contraction of the pipe, and allow for the following angular deflections:

- 6° up to and including 600 mm diameter;
- 5° over 600 mm up to and including 750 mm diameter;
- 4° over 750 mm up to and including 900 mm diameter;
- 3° over 900 mm up to and including 1 200 mm diameter;
- 2° over 1200 mm diameter.

The steel used shall conform to the appropriate British Standard Specification and each coupling is to be capable of withstanding the test pressure applicable to the pipes with which they are to be used without exceeding a stress in the steel of 67% of the yield point.

Couplings shall be protected by an approved epoxy coating system such as "Cupon KSIR88". The plain end of the steel pipe shall be properly prepared before corrosion protection so as to accept the flexible coupling.

## PSL 3.8.2.5 Restrained flexible couplings

Add new Sub-Clause:

Special restrained or anchoring flexible adaptor joints or flanged adaptor joints ("Viking Johnson" or similar) for connecting plain ended steel pipes to flanged joints are to be supplied complete with bolts, nuts, washers, gaskets, etc for connecting flanged joint to anchoring flange.



Anchoring or restraining flange to be welded approximately 300mm from plain end of pipe. Restraining flange adaptor to use minimum of 4 number grade 4.8 restraining bolts, equally spaced around circumference of flanges. Restraining flange to be to manufacturers specification and approved by the Employer's Representative.

### **PSL 3.8.3 Flanges And Accessories**

#### **PSL 3.8.3.1 Bolted connections (New sub-clause)**

All flanges, gaskets, bolts, nuts washers and other appurtenances required for the execution of the work shall be supplied and installed by the Contractor.

##### **PSL 3.8.3.1.1 BOLTED CONNECTIONS SHALL COMPLY WITH THE FOLLOWING:**

All pipes larger than 150mm diameter, connected to equipment or fittings, or where specifically indicated, shall be flanged to SANS 1123-2011 as amended, table 1600, 2500 or 4000 as scheduled. All flanges shall be truly at right angles to the axis of the pipe or fitting and shall be drilled with bolt holes off centre.

All plate flanges for welding shall be Type 3 and blank plate flanges shall be Type 8.

Puddle flanges shall be a minimum of the same diameter and thickness as the end flanges and shall be undrilled unless otherwise shown on the drawings.

All flanges, gaskets, bolts, nuts washers and other appurtenances required for the execution of the work under this Contract shall be supplied and installed by the Contractor under this Contract.

Any item of pipework that is found to have flanges that are incorrectly drilled shall be rejected. Reaming of bolt holes to oversize dimensions in order to make a particular piece fit shall not be permitted.

##### **PSL 3.8.3.1.2 GASKETS**

Gaskets shall be manufactured from "Klinger" or other approved material which complies with the requirements for Grade B of B.S. 2815.

All gaskets shall be 3 mm thick.

All gaskets shall be purpose made. Hand cutting and trimming of gaskets on site will not be acceptable.

Care should be taken to ensure that all gaskets are packed properly and are not damaged by bending. For larger sizes the gaskets shall be suitably supported by wooden frames during transit and while in store.

Gaskets are to be installed centrally without damage. No grease or other compound shall be used to hold the gasket in place prior to tightening the bolts. Ring Insert gaskets shall be installed after fitting the bottom half of the bolts and nuts loosely in order to ensure that the gasket assembly is centered properly. Full Face gaskets are to be centered by inserting bolts and nuts loosely around the circumference of the flange, at an even spacing.

The mating faces of flanges that are to be in contact with gaskets shall not be painted or coated. After application of all pipe and flange coatings, there shall be no runs or drips on the mating face and, where applicable, the flange profiling shall be clearly visible. After blast cleaning the mating faces shall receive one coat of rust inhibitor (Plascon Rustrix 84



or equal approved). There shall be no coating build-up in the flange bolt holes that could snag the bolts.

#### **PSL 3.8.3.1.3 MATCHED FLANGES**

Matched flanges shall correspond in construction and dimensions to flanges on equipment. Matched flanges shall be provided with the correct bolts, nuts and packing rings. All peening shall be clean before connections are made.

The faces of flanges that are in to be in contact with gaskets shall be masked and shall not be painted or coated. The mating flange shall then receive one coat of rust inhibitor (Plascon Rustix 84 or equal approved). Care shall be exercised to ensure that after the application of all coatings there are no runs or drips on the mating surfaces of the flanges and that the flange profiling is clearly visible over the entire face. Excessive coating build up in flange bolt holes that could snag bolts will not be permitted.

#### **PSL 3.8.3.1.4 INSULATING FLANGES**

Insulating flanges shall comply with the requirements of eThekweni Water and Sanitation .

Bolts, nuts and washers used on insulated flanges shall be as for the steel flanges shown on the standard drawing.

Bolts and nuts connecting mild steel flanges to stainless steel flanges, or stainless steel flanges to stainless steel flanges shall be Grade 304 stainless steel.

#### **PSL 3.8.3.1.5 BOLTS**

Bolts and tie bolts to be grade 4.8. Bolts, nuts and washers shall be hot dipped galvanised to SANS 121:2000/ ISO 1461:1999.

All bolts are to be tightened in a predetermined pattern with opposing bolts being tightened sequentially. When all bolts are tight, each bolt is to be torqued to the required/recommended torque in a predetermined pattern with opposing bolts being tightened sequentially.

All bolt threads shall be liberally coated with "Copper slip" or similar approved compound prior to assembly. Upon completion, bolt heads, washers and nuts shall be wrapped with the "Denso Mastic Blanket System" as described in elsewhere.

The length of each bolt shall be such that, after the bolt has been tightened, the end of the bolt is flush with the outside of the nut, or projects above the nut by a two full threads. Tie-bolts on restrained/anchoring couplings shall be fitted with "backing nuts" and washers.

#### **PSL 3.8.3.1.6 END COVERS**

Satisfactory temporary end-covers shall be provided by the Contractor for protection of flanges, prepared ends of open-ended pipes and fittings and screwed ends, to prevent damage to internal lining during transportation and during handling on site.

The end-cover on a pipe end or fitting shall remain in place during the entire installation process until the completion of a joint requires a cover to be removed.

#### **PSL 3.8.8 Joining Of Pipe With Plain End Conditions With Collar Welded Band (New Sub-Clause)**

Add new sub-clause

Pipe of nominal diameter, less than DN800, supplied with plain end conditions, shall be joined with the use of a band welded onto one end of the pipe where a joint is to be formed. The band is to form a socket type end condition with the pipe to be joined in a spigot and socket manner.

The collars/ bands shall have a width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, should this tolerance be required to be relaxed, this needs to be agreed with the Engineer and approved of by the Engineer.

A minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes.

The fillet weld where the band is welded to the pipe shall be a full fillet weld with no undercut.

The band shall be fitted with 50% of its width overlapping with each pipe end inserted into the band socket.

Weld procedures shall be developed for the welding of the band to pipe ends and for pipe joints made with fitted bands.

All pipe cut for the manufacturing of pipe specials to in lengths to suit, shall be joined with the collar welded method where a spigot and socket system as a result of an absent bell does not exist.

### **PSL 3.9 CORROSION PROTECTION OF PIPELINES, FITTINGS AND PIPE SPECIALS**

Delete the sub clause.

All corrosion protection clauses for steel pipelines are shown in this specification as Particular Specifications for corrosion protection, attached under the particular specification section.

All metal surfaces shall be prepared and coated in order to ensure that no bare metal is exposed to ambient conditions which could lead to corrosion.

The cost of application of corrosion protection mechanisms are specified are deemed to be included in rates for laying of pipe and fitment of specials and fittings and equipment.

Protection against electrolytic corrosion shall be in terms of the Employer's Particular Specifications.

### **PSL 3.10 VALVES**

Add the following to end of the Sub-Clause

All valves shall be wedge gate valves to SANS 664 of type "AVK" / "VAG" or equal approved. Valves of size DN350 and larger, shall to be supplied complete with gearboxes. All Valves shall be anti-clockwise closing when the spindle is viewed from above and supplied with cap tops unless otherwise specified on the drawings or bill of quantities. All valves where the cap top is buried deeper than 0.5 m shall have a spindle extension installed with the valve unless otherwise directed by the Employer's Representative. All spindle extensions shall be hot dipped galvanised to SANS 121:2000/ ISO 1461:1999.

Types of valves required in the works shall be as stated in the schedule of quantities and on the drawings. Where a particular make of valve is stated the contractor may offer an equivalent alternative, provided full details are submitted at the time of tender. The decision of the Engineer on acceptance of offer will be based on technical details required and full compliance thereof.

From this sub-clause delete "SABS 1200 LK" and substitute the following:-

### **PSL 3.10.1 Control Valves (New Sub-Clause)**

Add new sub-clause

The pressure reducing valve (PRV) and surge relief valve required shall be manufactured by Bermad, Bakers, Clayton and or other approved control valves suppliers, and shall comply with the following:

#### **General:**

- a) Each control valve and all other parts of the control valve assembly such as pilot valves, linkages, brackets, indicators, and all other components and everything necessary for the proper functioning of the control valve assembly shall be supplied and installed by the Contractor in accordance with the valve supplier's instructions and checked by a representative of the supplier after installation.
- b) Each control valve shall be suitable for operations under pressures of class 16 or greater
- c) Each control valve assembly shall then be commissioned and tested by the Contractor by using it to perform all of its automatic functions, as described below, in the presence of the Engineer and a representative of the firm which supplied the control valve to the Contractor.
- d) After satisfactory testing and commissioning of each installation, the control valve assembly shall be demonstrated and explained to a representative of the Employer, attending on the Site for this purpose, who is to be handed five copies of the Manufacturer's drawings and operating instructions prepared by the supplier of the control valve assembly.
- e) Each control valve assembly shall operate in the system indicated on the drawings and amplified by certain data set out below.
- f) The control valve assembly shall operate automatically and smoothly without attendance under all normal operating conditions.
- g) The control valve assembly shall be manufactured generally in accordance with SANS 1808-31 for automatic control valves and all components of the entire assemblies shall be made of specially selected corrosion resistant materials capable of withstanding the corrosive atmosphere which will exist in the pipe, valve chamber and structure.
- h) The interior surfaces of the control valve shall be coated with an approved epoxy compound similar or equal to KSIR 88.
- i) The control valve shall be fitted with an indicator to give visual indication of the position of the main diaphragm (i.e. to indicate the degree of the opening or closing of the valve).
- j) Approved strainers that can easily be cleaned, shall be supplied and installed on all pilot piping to protect the small ports from becoming clogged with grit.
- k) After acceptance of his tender, the Contractor shall obtain for the Engineer from the valve supplier, fully dimensioned drawings of the whole control valve assembly in triplicate, together with illustrations and the curves referred to above.

**PSL 3.10.2 Scour Valves (New Sub-Clause)**

Add new sub-clause

Scour valves shall be Wedge gate valves to SANS 664 and shall comply with eThekwini Water and Sanitation specifications.

**PSL 3.10.3 Isolating Valves (New Sub-Clause)**

Add new sub-clause

Isolating Valves shall be Resilient Seal Valves to SANS 664 and Butterfly Valves and shall comply with the following:

- Shall be flanged in accordance with the specified pressure rating
- Shall be of a Wafer type
- Flange to flange dimension shall not exceed 100mm
- Shall be supplied by a Manufacturer approved by eThekwini Water and Sanitation (e.g. Oreg, Amri, Gonec, JMC and AVK). Other Manufacturers to be pre-approved by the Employer.

**PSL 3.10.4 Air Valves (New Sub-Clause)**

Add new sub-clause

Air Valves shall comply with eThekwini Water and Sanitation specification and drawings

**PSL 3.11 MANHOLES**

Add to Sub-Clause:

**PSL 3.12 METERS (NEW SUB CLAUSE)**

Add to clause.

All meters are to be in accordance with the meter particular specifications.

**PSL 4 PLANT****PSL 4.1 HANDLING AND RIGGING**

Add to Sub-Clause:

The Contractor shall supply, operate and maintain an adequate fleet of vehicles including cranes to be used for the safe conveyance of the pipes, specials and fittings. The pipes and specials shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings.

The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

When handling 12m pipe lengths or longer, the pipes shall be lifted with band slings (minimum 300 mm wide) placed centrally around pipe at two points 6 metres apart.

For flexible pipe handling the maximum pipe deflections shall never exceed that stated under clause PSL 5.1.1 .

## **PSL 5 CONSTRUCTION**

### **PSL 5.1 LAYING**

#### **PSL 5.1.1 General**

Add to the Sub-Clause:

The Contractor will be held fully responsible for the care and safety of all pipes and fittings, etc, on site, and shall bear the cost of all renewals, which may be necessary to make good losses, damages or breakages. Furthermore, he shall be fully responsible for handling and re-loading material at the storage areas and for transporting and offloading of all such materials to the Site of the Works."

Pipe upliftment from pipe yards, transportation and stringing next to pipe trench for laying shall conform with the requirements of this specification.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Representative.

The use of bare cables, chains, hooks or narrow skids will not be permitted and the Contractor shall supply canvas slings and padded skids and ramps of a sufficient width to prevent damage to the protective coating. The dragging or skidding of pipes and specials in contact with the ground shall not be permitted.

Pipe shall be handled to ensure that no structural damage take place on any pipe or fitting at any stage.

Assembled PVC and HDPE pipe shall be protected for temperature variations in order to ensure that shrinkage as a result of temperature drops do not result in spigots withdrawing from sockets after having been inserted to the required depth.

#### **PSL 5.1.2 Damage**

Add the following to L 5.1.2:

All pipes, specials, valves and fittings shall be carefully examined by the Contractor for internal and external damage at the following stages:

- a) on arrival at laying site;
- b) prior to laying;
- c) after laying;
- d) prior to backfilling; and

- e) during backfilling.

All damage or defects of any kind shall be repaired by the Contractor and to the satisfaction of the Employer's Representative or an appointed third party inspection authority immediately after detection at any of the above inspections.

Where, in the opinion of the Employer's Representative, satisfactory repairs are not practicable, the damaged materials shall be replaced by the Contractor at his own cost.

### **PSL 5.1.3 Keeping Pipelines Clean**

Add to Sub-Clause:

The Contractor shall ensure that all pipe work is installed internally free of any contaminants. All traces of dirty water, slag, splatter, swarf, cuttings, coupons, welding rod ends, grinding dust, dirt and other debris are to be removed from the inside of the pipe as it is installed.

The Contractor shall ensure that all dust, grit and powder that accumulates in the pipe as a result of grit blasting for the repair of internal linings, be removed from the pipe in an acceptable manner before the internal lining repairs are carried out.

Once the lining repair has been completed, cleaned off and inspected, that specific section of the pipe shall be blocked off to prevent any further access by workers.

The Contractor shall take note that flushing of the completed pipeline may not be allowed after construction has been completed and therefore clean house keeping practices will be required under all circumstances during construction. The tendered rates for pipe laying shall include for the clean house keeping practices required.

Each section of the pipeline is to be internally inspected and passed by the Engineer once construction has been completed. If the pipework is not satisfactory, the Contractor shall re clean the pipe at his own expense until the pipe is passed clean. The Engineer reserves the right to utilize cameras or any other means to inspect inaccessible areas.

For small diameter pipes, the Engineer shall be afforded the opportunity to inspect internal cleanliness as pipe laying progresses.

#### **PSL 5.1.3.1 Cleaning valves and fittings (New sub-clause)**

Add new Sub-Clause:

All flanges, valves, fittings and equipment are to be installed in pipe work only after they have been thoroughly cleaned. Flange faces shall be checked for damage before being incorporated into the permanent works and any damage shall be reported to the Engineer.

#### **PSL 5.1.3.2 Inspection of Pipe Internals**

Add new Sub-Clause:

All possible care shall be exercised during construction in order to avoid damage being inflicted to the pipe lining as a result of the installation and welding activities, and the following procedures shall be adopted at all times:

- Wet sacking or rubber matting shall be placed on the pipe invert in the areas where welding or flame cutting operations are in progress to minimise the extent of damage to the lining from weld splatter or molten metal from flame cutting. This requirement shall be strictly enforced.

- Tools shall be placed on rubber foam or resilient rubber matting to protect the pipe lining against mechanical damages.
- Particular care is to be taken inside the pipe when tie-ins into the pipe is done for the purpose of fitting air valves, scour valves, by-passes and other tie-ins.
- The rates tendered in the Bill of Quantities shall include for all the measures required under this clause.

Each section of the pipe work is to be internally inspected and passed by the Employer's Representative, once construction has been completed. If the pipe work is not satisfactory, the Contractor shall clean the pipe at his own expense until the pipe is passed as clean. The Employer's Representative reserves the right to utilize cameras or any other means to inspect inaccessible angles.

#### **PSL 5.1.6 Equipment For Inspecting Internal Surfaces Of Pipes (New Sub-Clause)**

Add new sub-clause

##### **PSL 5.1.6.1 CCTV**

Weld Inspections

Immediately after the weld has cooled it is to be visually inspected both internally and externally. Internally the welds are to be checked with a suitable CCTV camera, if it is too small for physical entry. (Assuming welding of root welds were from outside the pipeline)

The internal surface of the pipe is also to be checked for any local damage. Internal and external photographs of the joint repair and weld are to be taken from 4 different angles at approximately 90° spacing, identified with adjoining pipe numbers and recorded. Weld and internal lining approval is to be signed off by representatives of the Contractor and Engineer.

The equipment shall be kept in good condition and operating order throughout the duration of the Contract. No separate payment will be made for this equipment and the costs therefore will be deemed to be included in the tendered rates.

Any defects of the weld or internal lining repair must be fixed in accordance to the specification and inspected again with a CCTV camera at the Contractor's expense

#### **PSL 5.1.7 Pipe Supports (New Sub-Clause)**

Add new Sub-Clause:

Temporary pipe supports may be used to assist setting up and assembly. However permanent pipe supports should be installed as soon as possible to minimize double handling and/or omission during construction.

Permanent pipe supports shall be constructed as indicated on the drawings or as directed on site.

Before testing, all permanent supports shall be complete and all temporary supports removed, unless otherwise agreed by the Engineer.

#### **PSL 5.1.8 End Caps (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall, at the end of each day's work, fit end caps to the open ends of the pipeline under construction. The end caps shall be manufactured in such a manner that it can be fitted to seal off the pipeline to the extent that it is totally dust and waterproof. The end cap must be able to withstand a pressure of 5.0m head of water externally when fitted. End caps shall be maintained during nonworking periods.

Notwithstanding the requirement for end caps, the Contractor remains responsible for preventing pipe being laid from floating during wet conditions. The Contractor remains responsible for dealing with water.

The tendered rates for the laying of pipe shall be deemed to include for the supply, fitment, and maintenance of the end caps.

#### **PSL 5.1.9      Marker Posts (New Sub-Clause)**

Add new sub-clause

Pre-cast concrete marker posts as shown on the drawings shall be set at all horizontal direction changes and where otherwise indicated by the Engineer.

The standard marker post rate shall include the supply and erection of painted, inscribed posts. The rate shall be inclusive of supply, erection and shall include for all necessary excavation, mass concrete footing and formwork.

### **PSL 5.2      JOINTING METHODS**

#### **PSL 5.2.1      Detachable Couplings (AC And Upvc Pipelines)**

Amend Sub Clause to reflect as follows:

Replace reference to "AC" with "Concrete" or "Fibre Cement" as is applicable.

Allow "uPVC" to refer to all PVC pipe derivatives namely "u", "O" and "M" .

#### **PSL 5.2.2      Flanged Joints**

Add to the Sub-Clause:

Before being brought together, the ends of the pipes, fittings, couplings and flanges are to be inspected and cleaned to ensure that all parts forming the joint are undamaged and clean.

When jointing flanges, the faces shall be cleaned thoroughly and approved jointing material (compressed fibre cement or other approved gaskets on flanged joints), cut properly to size, is to be inserted immediately before bringing the two flanges together. Before closing the joints, the flanges must be parallel to each other, with all bolts inserted in the bolt holes. After the fittings have thus been aligned and well supported, the joint shall be bolted up to a uniform tightness using torque wrenches to achieve the required compression force on the gasket. Diagonally opposing bolts shall be tightened sequentially.

If and where full face gaskets are used, the jointing material shall be flush with, or protrude beyond, the outer circumference of the flange (this is not applicable to raised face flanges). On completion of the joint, the flanges and bolts shall be protected as described in the particular specification for corrosion protection of flanged joints.

Flanges to fittings or joints will generally be to SANS 1123. It is possible, however, that the Employer may supply valves with flanges which have not been drilled according to



these standards. The Contractor shall be responsible for checking the flange drilling of all fittings supplied by the Employer and for supplying flanges drilled to match. No additional payment is to be made for this work and the Contractor is to allow for such in his rates.

Contractors are to allow in the rates for the supply and installation of mild steel pressed washers (two per bolt) for all flanged fittings. The washers shall have an ID of 2 mm greater than that of the bolt. Tenderers are to ensure that the length of the bolt includes allowance for the washers.

All bolts, nuts and washers to be in accordance with PSL 3.8.8.

Wherever loose or slip on flanges are welded onto pipelines, the Contractor shall ensure that the flange is lined and coated to project specifications and that all repairs to the lining and coating are in accordance with the project specification.

### **PSL 5.2.3 Welding Steel Pipelines DN600mm Or Greater**

Delete the title and replace with

**“Welding (Steel Pipelines)”.**

Delete the 1<sup>st</sup> sentence and replace with:

Unless otherwise indicated on the drawings, field jointing of Bell-ended pipe by fillet welding is required. Field joint of bevelled ended or plain ended pipelines equal to or less than DN600 require collars/bands to be welded to the ends of the pipelines.

The collars/ bands shall have a width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes.

Field welding of steel pipelines shall be carried out in accordance with the relevant requirements of the latest version of API 1104. The Contractor, prior to commencement of welding, shall produce a qualified welding procedure in accordance with the latest version of API 1104, for the intended sizes, processes, positions and consumables to be used on this project.

Welding shall be carried out by welders who are competent in terms of the procedure approval test given in API 1104. Prior to commencement of welding, the current qualification of each welder must be produced in accordance with the welding procedure. Should constant repairs be required on welds carried out by one particular welder, the Engineer may request that the welder be re-tested or removed from the project.

Add to the Sub-clause:

#### **Examination of Welds**

The Contractor shall include in his prices for the manufacture and/or laying of pipes, bends, fittings and specials for the cost of carrying out, under the supervision of an inspector appointed by the Employer, examination of welds on the following basis:

- a) Manufacture of Pipes (Not applicable to pipes supplied by the Employer)
  - i) FIVE percent (5%) random radiographic examination of all welds deposited by an approved automatic process.

- ii) TEN percent (10%) random radiographic examination of all welds deposited manually or semi-automatically, and repairs to welds done by an automatic process (should repairs exceed 25% of the tests the percentage of examination shall be increased to 20%).

b) Field Welds

Radiographic testing will be performed on butt welds and dye penetrant testing on fillet welds. Welds will be tested and adjudicated in accordance with API 1104 and will be tested with the following frequencies:

The first 10 welds executed by each Welder will be tested. Thereafter, 100% of all further welds will be tested, with no random sampling or reduced testing frequency. If no discontinuities are discovered, 25% of his/her further welds, chosen at random by the Engineer, will be tested. If during the 10% testing, discontinuities are discovered both welds immediately adjacent to the defective weld will be tested. If these joints are found acceptable testing will remain at 100%. If, however, defective welds continue to be evident, testing will be increased remain at 100% with no reduction in the testing frequency.. Only once the welding has returned to an acceptable standard and at the discretion of the Engineer, will the percentage be reduced again.

Repairs of welds will be permitted in accordance with approved repair procedures. Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor.

c) Welds in Fabricated Bends, Fittings and Specials

- i) ONE HUNDRED percent radiographic examination of all weld deposited manually or semi-automatically in bends, fittings and specials which cannot be hydraulically tested because they have a plain end.
- ii) ONE HUNDRED percent radiographic examination of all welds deposited manually or semi automatically in all flanged bends, fittings, and specials which are to be tested hydraulically.

The Engineer shall in all cases determine which welds are to be radiographed on the quantity basis specified above. All radiographs and records thereof made by the Contractor shall be made available to the Engineer to enable him to determine whether the welds are acceptable or not and no lining or wrapping of pipes shall be permitted until the welds have been accepted by the Engineer. To avoid any unnecessary delays, at the option of the fabricator, radiographs may be approved by the manufacturer's inspectors subject to them being subsequently submitted to and approved by the Engineer.

When a section of the weld is shown by radiography to be unacceptable, and if the limits of the deficient weld are not defined by the radiograph, additional radiography shall be carried out at the Contractor's expense until the limits of the deficiency are determined.

Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor. All repair welds shall be identified with a stamp marking, indicating which welder conducted the repair. Repaired welds shall be radiographed at the Contractor's expense but, after any repair welder has had ten consecutive repairs approved, the extent of the radiography of the repairs conducted by the welder may be decreased by agreement between the Engineer and the Contractor.

In the event of any welded joint proving unsatisfactory when the pipeline is subjected to the radiographic, dye penetration or hydraulic tests, the Contractor shall be held responsible for all costs involved in repairing the joint or cutting it out and welding in a new section of pipe, as may be ordered by the Employer's Representative, thereafter restoring

the lining and wrapping, if these have become damaged, all to the satisfaction of the Employer's Representative.

After jointing and testing, the protective lining and wrappings are to be rendered continuous in the manner specified. Holiday detection tests shall be carried out in the field to ensure continuity of lining and wrapping.

#### **PSL 5.2.3.1 Production Testing of Welds**

(Not applicable to pipes supplied by the Employer)

The Contractor shall also include in his prices for the supply of pipes the cost of carrying out at the factory, non-destructive tests of shop production welds (additional to the qualification tests for welding procedure) on the following basis:-

One pipe from each 30 pipes produced shall be selected at random and specimens for two guided cold bend tests and one transverse tensile test shall be cut therefrom and tested in accordance with SANS 719, Section 7.

In the case of the guided cold bend tests, where welding is carried from one side only, bend - specimens shall be tested with the rest of the bend in tension; where welded from both sides the specimens shall be tested with the inner and outer welds in tension alternately.

Tensile tests shall be carried out as for the qualification tests.

The pipes from which successfully tested specimens have been taken shall be trimmed to the maximum possible length and shall be accepted by the Employer for payment purposes as full standard pipe lengths.

In the event of the welds of any pipe failing to reach the standard of acceptance, such pipe shall be rejected. Two further plate coupons shall be prepared from different pipes, selected at random by the Engineer, for each specimen that has failed to reach the required standard. In the event of such additional tests proving to be satisfactory repairs to the pipe originally failing any test will be permitted by the Engineer and such repairs and subsequent re-test shall be at the Contractor's expense. In the event of the additional tests also failing to reach the required standard the Engineer shall have the right to reject the entire batch of pipes from which the coupon plates were cut.

#### **PSL 5.2.3.2 Welding procedures and welding staff:**

The qualification tests for welding procedure shall be carried out generally in accordance with the requirements of API 1104: The detailed procedure to be adopted during manufacture shall be established. Prior to commencement of welding, the current qualification of each welder must be produced in accordance with the welding procedure. Should constant repairs be required on welds carried out by one particular welder, the Employer's Representative may request that the welder be re-tested or removed from the project.

The Contractor shall maintain a record of all welders employed on the works giving particulars of each individual welder's qualification tests carried out in terms of API 1104, the cost of which shall be borne by the Contractor. Qualification testing of welders shall be conducted in the presence of the Employer's Representative or his representative.

Before a welder is employed on tack or root welds, he shall carry out a test tack and root weld on a pipe of the same materials and under conditions as close as possible to those experienced on the actual pipeline.

The tests are to be carried out either before manufacture of the pipes to be supplied under this contract is commenced or before the manufacture of pipes in excess of a number previously agreed by the Employer's Representative is carried out.

The coupon plates shall be prepared either from plates of the same material as the pipe and welded in a similar manner to that to be used during production, or by cutting suitable specimens from a pipe selected at random by the Employer's Representative from the first production pipes. The coupon plate for the tensile weld test and those for the guided cold bend tests shall be prepared in accordance with the requirements of SABS 719.

The qualification tests shall be considered satisfactory if:

- a) The weld has a joint efficiency greater than 95% of the minimum specified tensile strength of the parent metal and,
- b) the bend test specimens are capable of being bent around a former with a diameter equal to six times the nominal thickness of the plate to an angle of 180 degrees without developing a crack, except at the arises of the specimen, of length or width greater than 3 mm.

Failure to pass the above qualification tests shall result in the rejection of any pipes welded with the procedure used and the preparation of a new qualification of procedure test.

Any changes in the electrode case type used or change of flux used shall require a qualification test before approval of the procedure is granted.

#### **PSL 5.2.3.3 Welding Procedure**

All welding shall conform to the approved welding procedures, which must be submitted to the Employer's representative for approval.

The minimum number of root bead welds, the minimum number of second bead welders and the type of clamp used (internal or external) shall be given in the description of the welding technique as specified above.

All welding procedures shall incorporate the power brushing of all welds after having deposited each and every layer. It is a condition of this specification that each and every weld run be power brushed before the next run is deposited.

Welding shall not be performed under conditions that could affect the quality of the welded joint (e.g. high moisture or windy conditions). Wind and rain shields may be used where practical.

**NOTE: Should the Contractor want to utilize shorter lengths of pipe than those supplied, for construction purposes, in order to work in confined areas, a detailed method statement in motivation for such cutting, shall be submitted to the Employer's Representative for approval. Pipes shall not be cut into shorter lengths for construction purposes, unless approved by the Employer's Representative. The costs associated with any additional welds at joints, as a result of cutting pipes into shorter lengths as approved by the Employer's Representative, shall be borne by the Contractor.**

#### **PSL 5.2.3.4 Quality control**

Add new Sub-Clause:

Records of which welds were carried out by each individual welder as well as the respective results of non-destructive testing shall be submitted to the Employer's Representative at

each monthly site meeting. Should there be repetitive or serious welding defects, this information shall be forwarded to the Employer's Representative immediately.

Each weld and welder shall be given a unique number which shall be logged against each weld. This data will be used for reference on construction records, drawings, reports, radiographs and NDT records.

#### **PSL 5.2.3.5 Weather conditions (New Sub-clause)**

Add new Sub-Clause:

Welding shall not be performed under conditions that could affect the quality of the welded joint (e.g. high moisture or windy conditions). Windshields may be used where practical.

#### **PSL 5.2.3.6 Field Welding:**

Where scarf cutting of the pipe ends is required in the field the pipe ends shall be prepared by machining or machine flame cutting. Hand flame cutting shall not be permitted except under the following circumstances

Steel pipes may be cut by hand flame as follows:

- In the case of cement lined steel pipe, the cement lining shall be chipped back 50 mm after the initial cut and the pipe then re-cut  $\pm 10$  mm from the original cut in order to remove any "blow-back".
- In the case of epoxy lined steel pipe, all damaged lining shall be removed and reinstated in compliance with the Clause 3.9.
- All flame cuts shall be made good by grinding to form the correct gap between steel sections prior to welding.
- Bevels may be cut by flame provided they are made good by grinding.

When jointing pieces by butt-welding the number of tack welds applied shall be kept to a minimum to be effective in holding the pipe ends securely and to maintain the required root gap prior to welding, but shall in any case be not less than four.

#### **PSL 5.2.3.7 Clearance (New Sub-clause)**

Add new Sub-Clause:

The minimum clearance around the pipe during welding shall be 500mm or such other minimum distance that may be required to facilitate compliance with the approved welding procedure. When welding in the trench, adequately sized "fox holes" shall be excavated / formed so as to provide adequate access for the welders.

Excavation for fox holes shall be deemed to be included in the rates for pipe trench excavation.

#### **PSL 5.2.3.8 Visual Inspection**

Add new Sub-Clause:

100% of each joint will be examined and the following criteria met:

All welds shall be substantially uniform in appearance with the inner and outer weld beads not exceeding 1 mm and 3 mm respectively in height above the pipe surface.

The weld, heat affected zone and surrounding parent metal shall be free from cracks, porosity and trapped slag.

All weld splatter must be removed prior to the application of corrosion protection.

#### **PSL 5.2.3.9 Welded Attachments:**

Where it is necessary to weld attachments to pipe work (e.g. Cathodic Protection Lugs and Pipe Support Brackets and Trunnions) the material of the attachment is to be compatible with the pipe work and be welded on by an approved welder using approved welding procedures.

Welded attachments onto pipe work are to be subjected to the same level of NDT as the pipe work.

#### **PSL 5.2.3.10 Screens for Welding**

No welding or cutting equipment liable to cause sparks or flashes shall be used at or above ground level unless the operation is carried out within a suitable enclosure, or unless suitable screens are erected in order to shield passers-by from the emitted light and/or sparks.

#### **PSL 5.2.3.11 Aligning**

Add new Sub-Clause:

The alignment of abutting ends will be such that the offset does not exceed 1.5 mm. Line up clamps may be used for joint "fit-ups."

"Dogs" and wedges for the alignment of pipe work for butt when fitting up before welding, shall not be allowed as a rule. Should the Contractor require to use "dogs" and wedges, approval from the Employer's Representative shall be obtained. The Contractor shall, upon removal of any "dogs" and wedges pay attention to the following repair requirements:

- Where "dogs" and wedges have been removed from the pipe, the damage to the metal surface of the pipe shall be ground clean.
- The required number of welding runs shall be performed in order to fill the hole with welded material.
- The filled area shall be ground smooth in order to ensure that the repaired area is level with the original pipe material.
- A dye penetrant test or whichever is most applicable, shall be executed on the repaired area before repairing the external coating.
- The repair to the outer coating shall be effected in terms of the accepted procedure for coating repair.
- The repair to the inner lining at the point of removal of "dogs" and wedges shall be effected in terms of the accepted procedure for lining repair.

#### **PSL 5.2.3.12 Manufacturing of Crotch, Saddle Plates, Wrappers and Gussets**

The Contractor shall pay careful attention to the detail when crotch and saddle plates, and/or gussets and wrappers are manufactured. All plate material for any one of these items shall, where it has to be welded together or welded onto pipe specials, be bevelled to the extent that full penetration welds would be possible under all circumstances. The Employer's Representative is to be requested to inspect all applicable fit ups for approval,

before welding commences. (This is required for workshop fit ups as well as field fit ups). 100% NDT testing or other applicable test methods will be required on all welds to crotch and saddle plates, gussets and wrappers. The tendered rates for the manufacturing of pipe specials which require crotch plates, saddle plates, gussets or wrappers, shall be deemed to include for all the material to be supplied, the welding and NDT testing as required by this specification.

All Crotch plates are to be manufactured from Grade X42 steel plate or Grade 300WA steel plate for all sectors.

Saddle plates and Wrappers shall be manufactured from pipe supplied by the Employer as Free Issue material (here after called donor pipe material). The saddle plates and wrappers shall be manufactured from the same grade of donor pipe and the same diameter as the pipe on which the saddles or wrappers are to be fitted. Coating on the pipe, onto which saddles or wrappers are to be fitted, shall be removed and saddles or wrappers shall be cut from the donor pipe material to the required dimensions. The donor pipe material shall be slightly heated and then hammered into shape onto the accepting pipe in order to take up the required diameter.

All saddle plates are to be manufactured from free issue pipe material of same DN and grade as the main pipe, in terms of the drawings for the specific pipe special.

All crotch plates are to be manufactured from material procured by the Contractor, in terms of the drawings for the specific pipe special.

#### **PSL 5.2.3.13 Pipe DN800 and smaller**

The requirements of PSL 3.8.8 shall be met.

#### **PSL 5.2.5 Cut Pipes (New Sub-Clause)**

Add new Sub-clause:

Cut pipes shall be used where required as closure lengths. The cut ends shall be prepared in accordance with clause 5.1.5 of SANS 719. The finished dimensions of ends cut on site must be within the tolerances applicable to the ends of the particular types of pipe to be laid. The cost of cutting and trimming of pipes shall be included in the rates tendered for laying and jointing pipes.

In the case of bell end steel pipe DN600 and smaller, where pipe is cut on site to suit the length required, and the length of the off-cut is 1 metre or longer, then a collar shall be welded on to one end of the off-cut such that it may be used in the remainder of the pipeline. The collars shall be fabricated from flat plate of the same steel grade and of thickness not less than 4mm greater than the wall thickness of the pipe to which it will be welded. The collars shall provide an insertion distance the same as that of the connecting bell ended pipe.

#### **PSL 5.2.6 Jointing Of Upvc Pipe Sections And/Or Fitment Of Special Fittings (New Sub Clause)**

Add new sub clause:

All spigot and socket joints of uPVC pipe and fittings shall be installed according to SANS 966 and comply with manufacturers requirements and fittings.

Before any joint is made the spigot end to be inserted into the socket shall be measured and marked in order to show the depth of insertion required of spigot and socket. The mark



shall be clear and permanent enough to ensure that it is visible once jointing is complete. The mark shall be made 5mm further from the end of spigot than the required insertion depth in order to be able to see the mark 5mm from the socket end once inserted into the socket.

Every socket shall be checked to ensure that it is free of grit, sand and debris or foreign material before spigot end is inserted.

Spigots shall be free from burrs before fitment.

Chamfers on the spigot end shall be uniform to approximately 15 degrees and must occur around the external circumference of the pipe to approximately half of the wall thickness.

Rubber rings shall be clean and free of stones and grit.

The quality plan to be developed for pipe jointing shall allow for checking of each and every joint by the pipe installations supervisor before a joint is done.

No deflection will be allowed between two pipe sections or pipe and fitting sections at the joint.

The quality plan to be developed for pipe jointing shall allow for checking of each and every joint by the pipe installations supervisor before a joint is done.

No jointing shall be effected with the use of a PVC glue.

### **PSL 5.3      SETTING OF VALVES, SPECIALS AND FITTINGS**

Add the following:

Valves and fittings shall be installed in accordance with the manufacturer's instructions. Where valves are supplied by the Employer at Municipal depots they shall be collected by the Contractor at such depots and transported to the laying site.

Valves are to be set correctly in the positions indicated and supported on concrete stools, except where not so required by the Employer's Representative and shall be installed with their operating spindles vertical. Valve spindle guide brackets and stays where provided shall be secured into position against concrete work and these must be set and carefully adjusted in order to give true vertical alignment of the spindle. The Contractor shall supply the insertions and bolts necessary for the installation of the valves.

#### **PSL 5.3.1      The Storage, Commissioning And Installation Of Butterfly Valves**

Add new Sub-Clause:

Butterfly valves shall be stored, installed and commissioned so that the valve blade seal is protected at all times from oxidation, ozone attack and the ingress of dirt. All butterfly valves are to be installed such that the disc is installed horizontal to the flow direction with the hand wheel on the right hand side of the flow direction.

##### **PSL 5.3.1.1      Storage**

Add new Sub-Clause:



- The valve is to be stored in the vertical position.
- The valve should be stored in the cracked position (i.e. not shut).
- The valve should not be stored in the vicinity of electrical equipment.
- The valve should be stored under cover and protected from temperature extremes.

#### **PSL 5.3.1.2 Installation and commissioning (New sub-clause)**

Add new Sub-Clause:

- Prior to the installation of the valve, all dust and dirt should be washed off the valve, particularly the seal, seat and any tapped holes in the valve body.
- The seals of all valves shall be checked for complete closure when the valve blade is in the fully closed position. (See seal adjustment below).
- The valve must not be lifted by the hand lever, valve actuator or the handwheel.
- The valve must not be used for lining up the pipework.
- The valve should be left in the fully open position after installation and prior to commissioning of the system.
- The valve is to be installed such that the disc opens in the direction of flow and is horizontal to flow.

The valve is to be installed such that the hand wheel is on the right-hand side of the pipeline in the direction of flow

#### **PSL 5.3.1.3 Seal adjustment (New sub-clause)**

Add new Sub-Clause:

To adjust the seal, a 0,004" feeler gauge and an Allen key are required.

With the valve in the fully closed position, it should be possible only with difficulty to introduce the feeler gauge between the valve blade seal and the seat.

If, due to seal movement during storage the feeler gauge can easily pass between the seal and seat, then the clamp ring socket head cap screws in the vicinity of the gap should be finger tightened with the Allen key so as to push the seal out and close the gap.

#### **PSL 5.3.4.1 Payment**

All costs incurred for the seal adjustment as stipulated above shall be included in the respective rates for installation of the valves.

### **PSL 5.5 ANCHOR/THRUST BLOCKS AND PEDESTALS**

In the fourth line of the Sub-Clause delete "15 MPa/37,5 mm" and replace with "20/19"

Add to the Sub-Clause:

For continuously welded or flanged steel and HDPE pipeline anchor/thrust blocks are not required except where specifically shown on the drawings and scheduled in the Bill of Quantities.

For PVC pipe, anchoring is required at all directional changes, at all valves, all stops and reducers. Where anchor points are in direct contact with the pipe for example bends, the bend shall be protected by means of a layer of plastic sheeting of minimum 250 microns thick. The rate for anchor block installation shall be deemed to include for this requirement.

Concrete pressure pipe shall be anchored at all directional changes, at all valves, all stops and reducers.

## **PSL 7      TESTING**

### **PSL 7.1      GENERAL**

Add to the Sub-Clause:

#### **Inspection**

Facilities shall be provided to the Employer's Representative so that he may be able to inspect, during the process of welding, any layer of weld metal. He may require any defective welds either to be cut out and re-welded or repaired at his discretion. The Contractor shall clean thoroughly all welds prior to inspection. The Employer's Representative may require a number of completed joints, selected at random, to be cut for mechanical tests or to be selected for visual inspection, micro examination or examination by other means. When the Employer's Representative orders the Contractor in writing to cut out and test joints the Contractor shall be paid for such work at day work rates.

If as a result of inspection and testing, the work of any welder is found to be unsatisfactory, the welder shall not be permitted to continue welding under this contract.

#### **Standards of Acceptability**

The completed welds shall comply with the requirements of Clause 6.0 of API 1104. Work on which unauthorised repairs have been carried out may be rejected.

#### **Repairs to Minor Faults**

Faulty welds shall be rectified in accordance with clause 7.0 of API 1104.

All costs relative to the repair of faulty joints, including removal and replacement of the backfill and making good the wrapping and lining shall be borne by the Contractor.

### **PSL 7.1.2      Non Destructive Testing (New Sub-Clause)**

Add new Sub-Clause:

The Company or individuals appointed to execute NDT testing shall have an approved accreditation with the National controlling authority and the Contractor shall allow for this in his rates for welding.

The standard method for Non-destructive Testing of butt welds is X-Ray testing. Under certain circumstances however, X-Ray testing of welds is not possible as a result of limited access. The Contractor shall allow in his rates for alternative test methods of welds where required (Example: Ultrasonic, Magnetic Particle Inspection, Dye Penetrant Tests, Etc).

The standard method for Non-destructive Testing of fillet joints (sleeve or "belled end" pipe joints) is dye penetration testing.

In the event of any welded joint proving unsatisfactory when the pipeline is subjected to the radiographic, dye penetration or hydraulic tests, the Contractor shall be held responsible for all costs involved in repairing the joint or cutting it out and welding in a new section of pipe, as may be ordered by the Employer's Representative, and thereafter, for the costs of retesting the final weld and restoring the lining and wrapping, if these have become damaged, all to the satisfaction of the Employer's Representative.

After jointing and testing, the protective lining and wrappings are to be rendered continuous in the manner specified. Holiday detection tests shall be carried out in the field to ensure continuity of lining and wrapping.

The tendered prices for uplifting at the pipe yards, transportation to the work front, handling, laying, jointing and testing of pipes are to include for all the work described above and for the supply of all necessary materials including welding, all necessary plant and labour etc.

## **PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES**

### **PSL 7.2.1 Dye Penetrant Test**

Add to Sub-Clause:

100% of all fillet welds and other welds shall be dye penetrant tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative

### **PSL 7.2.2 Radiographic Examination**

Add to Sub-Clause:

100% of all butt welds shall be radiographically tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative.

#### **PSL 7.2.2.1 Radiography personnel**

Radiography and handling of associated equipment shall only be carried out by qualified and approved Radiographers.

The Radiographers shall be in attendance and patrol the perimeter of the Radiographic Area at all times during "bombing".

#### **PSL 7.2.2.2 Marking of radiographic area**

Areas where Radiography is going to take place shall be clearly marked off with recognized tape and warning signs. Generally, this shall be a strip of about 6m wide on each side of the trench and 15m radius elsewhere. The location of the source shall be clearly marked by a red flashing light and the boundary marked by yellow flashing lights.

No person except approved Radiographers shall be allowed to enter the marked off area during radiography exposure.

The Contractor shall ensure that there is easy access for Radiography personnel to minimise their exposure to radiation.

**PSL 7.2.2.3 Warning of commencement of radiography**

When radiography exposure is about to commence, adequate warning to persons in the vicinity will be given by flashing lights and audible signals, whereupon all persons within the marked area shall immediately move to a safe position outside the marked area.

Before commencing radiography, the Radiographer shall carry out a thorough inspection to ensure that all personnel have left the area.

**PSL 7.2.2.4 Completion of radiography**

Completion of radiography shall be indicated by the switching off of all flashing lights and an audible signal.

Warning tape and warning signs shall be removed immediately upon completion of radiography in order to allow general work to proceed as planned.

**PSL 7.2.2.5 Storage of radioactive sources**

Radioactive sources may only be brought onto site with the approval of the Employer's Representative. The Radiographers must demonstrate that they have a recognized, safe and secure method of storing such sources.

**PSL 7.2.3 Ultrasonic Examination**

Add to Sub-Clause:

Ultrasonic testing will also be allowed as an alternative to other testing methods. 100% of all butt welds shall be ultrasonically tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative.

**PSL 7.3 STANDARD HYDRAULIC PIPE TEST**

The Contractor shall be required to submit to the Employer's Representative a proposed methodology of how he intends to undertake the pressure testing of this pipeline, with attention given as to how the water used for the hydraulic testing of one section can be reused for filling and testing of a following section. The position of the required metered filling points also needs to be agreed with the Authority responsible for the water supply systems of the region.

**PSL 7.3.1 Test pressure and time of test**

Add to the Sub-clause

The field test pressure shall be as per the below table:

Reference Section	Filling Rate (l/s)	Test Head (kPA)	Time of Saturation	Time of Pressure Test
All Pipelines	20 l/s	1600	24 hours	24 hours

Add to the Sub-clause:

Each portion of the pipeline shall be subjected to a field test pressure as tabled above and the pipeline sections may be tested will be at the discretion of the Contractor provided that:

- a) Each section lies within a single test-pressure portion as described above and below in Clause PSL 7.3.1.6 and PSL 7.3.1.7.

- b) The pipeline shall not be tested in sections exceeding a maximum allowable length of 500 m unless otherwise agreed by the Engineer and taking cognisance of any restriction on the length of open trench allowed. The Contractor shall make due allowance in the construction programme and in the tendered rates for the entire testing operation including for the provision of temporary end stops (flanges or bullnoses) and any other costs associated with testing the pipeline in intermediate sections.

#### **PSL 7.3.1.2**

Delete sub clauses 7.3.1.2

#### **PSL 7.3.1.3**

Delete sub clauses 7.3.1.3

#### **PSL 7.3.1.6 Field Testing of Steel Pipelines**

Add new Sub-Clause:

The required test pressure for all STEEL pipework shall be 1600 KPa measured at the lowest point of the pipeline(s).

- The pressure tests on the pipeline shall not be carried out against closed valves unless otherwise agreed with the Engineer. All terminal ends on the pipeline sections being tested shall be capped with blank flanges, bull nose ends or “spade” pieces as instructed by the Employer’s Representative. Bull noses against which pressure testing is done, shall be welded onto the pipeline with full penetration welds as per the same specification as for a butt welded joint for the specific diameter.
- Shorter sections of pipeline may be tested at the discretion of the Contractor. Should the Contractor opt to test the pipeline in shorter sections, he shall so state in his tender and make due allowance for the additional time required in the construction programme and in the rates for temporary capping or flanging and any other ancillary costs incurred. The pipe shall not be tested until the associated structural concrete has cured for 28 days or until such concrete has attained the specified design strength.
- In the case of cement mortar lined pipelines. once filled, the pipe shall be left for 24 hours to permit maximum saturation of the cement mortar lining.
- The section of pipeline to be tested shall be pressurised to the “TEST PRESSURE” given above and left for 24 hours, during which period, the pressure drop (if any) shall be monitored with the permissible leakage for pipe = 0 litre/m.
- Should there be a pressure drop after two hours, the pipe shall be re-pressurised to the “TEST PRESSURE” and the make-up water volume carefully noted.
- The make-up volume (if any) shall be compared to the volume of water collected at visible leaking points. Should the make-up volume not be equal to the volume collected at the visible leaking points, the pipe section will have failed the hydraulic test. Should there be a pressure drop with no visible leaks, or should a significant increasing trend in make-up water be apparent, the pipe section will have failed the hydraulic test.
- The logistics and strategy for filling and hydraulically testing the pipeline need to be planned in detail and agreed with the Employer’s Representative at the early stages of this contract. Arrangements need to be agreed with the

Employer (eThekweni Water Services) for making available metered water supply points for filling the sections of the pipeline that need to be tested.

- The Contractor shall be required to submit for the approval of the Employer's Representative, a detailed plan of the logistics for transferring the water from a section of the pipeline that has been successfully hydraulically tested, into the next section, so as to minimise the amount of water that might otherwise have to be discharged to waste.
- Commissioning of any Section of the pipeline shall only proceed after the pipeline hydraulic testing is successfully completed.
- Bull-nose ends may be fabricated from off-cuts of pipe supplied for the relevant section of the pipeline to be tested and will become the property of the Employer once the tests are successfully completed.
- The rate for pressure testing is deemed to be inclusive of fabrication and installation of bull-noses, scouring, supplying and install blank flanges, spade pieces etc for the hydraulic test and for removing these items on completion of the successful tests.
- On successful completion of the pressure test as per above, the Contractor is to remove all temporary blank flanges, spade pieces, etc. and pressurise the line to maximum working pressure against closed valves. Should any valve not be drop tight at this pressure the Contractor is to advise the Employer's Representative in writing of all defects encountered. The duration of this test shall be 2 hours. The rate for the testing against closed valves is deemed to be inclusive of the pressure testing rate.
- All tests shall be carried out in the presence of the Employer's Representative at such times and in such manner as he may direct.
- Provision shall therefore be made by the Contractor for the supply of all necessary bull-noses and blank flanges.
- At all times when there is water in the pipeline, and particularly during filling, testing and draining of the pipeline, all air valves shall be in operation and their individual isolating valves shall be open.

#### **PSL 7.3.1.7 Testing Procedure for PVC and HDPE pipelines**

Add new Sub-Clause:

The required test pressure for all pipelines shall be 1200 KPa for uPVC and 1250 KPa for HDPE measured at the lowest point of the pipeline(s) with a maximum elevation difference of 20metres and maximum horizontal distance of 500metres between pressure test points.

All costs relating to this work inclusive of scouring, supplying and install blank flanges, spade pieces etc are to be included in the rate for testing. The duration of this test will be minimum of 1 hour.

Prior to testing, sections of the new pipeline shall be installed between one or more reticulation isolating valves complete with all fittings, valves and communication pipelines.

**The hydraulic testing of pipework against closed valves is not allowed.**

The pipe section shall not be filled until associated structural concrete has cured for 28 days and attained design strength and all permanent anchors and fasteners are in place.

The pipe shall be filled at a rate that permits the escape of air and does not induce transient pressure surges.

### **PSL 7.3.3 Permissible Leakage Rates**

Add new Sub-clause:

In the event that a pipe section fails a test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of each individual section and the entire pipeline, at his/her own expense. Such remedial measures shall in no way compromise the original pipeline specifications.

Add to the end of the sub-clause

The permissible leakage for

- a) Steel pipelines and fittings = 0 litre/m.
- b) PVC pipelines and fittings = 0 litre/m.
- c) HDPE pipelines and fittings = 0 litre/m.

### **PSL 7.3.4 Water For Hydraulic Test And Disinfection (New Sub-Clause)**

Add new Sub-clause:

Water used for one filling of the pipeline for hydraulic testing, one filling for disinfection and one filling after draining the disinfection water, should disinfection be required, will be provided by the Employer to the Contractor, free of charge via a metered Supply. The Contractor is to provide suitably sized meter at the connection point. Additional water supplied by the Employer owing to unsuccessful disinfection and/or hydraulic testing will be charged to the Contractor.

The tendered rates for the construction of the pipeline and the testing thereof are deemed to include for the cost of water for construction purposes and fillings, subsequent to the first fill.

Filling of the pipeline for hydraulic testing shall be carried out under the supervision of the Employer's Representative.

Filling of the pipeline for hydraulic testing shall be carried out in accordance with clause 7.3.1

The Contractor shall, at his own cost, provide a suitable means of conveying water from this connection to the mains to be tested, as well as a connection on the new pipeline in order that it may be filled. This connection shall be capped or removed to the satisfaction of the Employer's Representative upon completion of the hydraulic test. Payment of this shall be allowed for under the rates for the hydraulic testing of the pipeline.

### **PSL 7.3.5 Initial Filling Of Pipeline (New Sub-Clause)**

Add new Sub-Clause:

The entire process for filling the pipeline at any time during testing or disinfection shall be carried out under the supervision of the Engineer and may also be monitored by the Employer. Under no circumstances will the Contractor be allowed to carry out filling of the

pipeline without the supervision of the Engineer, neither shall he/she permit any other persons to carry out such filling without the written permission of the Engineer.

Any damage to the pipeline caused by non-compliance with this clause shall be rectified at the Contractor's expense.

Filling shall commence at the lowest end.

Maximum filling rates might be limited by existing pressure conditions of the system at the connection point. These conditions need to be pre-determined and filling rates available need to be built into the programme for construction of the Works. No claims for delay as a result of low supply pressure will be entertained.

#### **PSL 7.3.6      Connections After Testing (New Sub-Clause)**

Add new Sub-clause:

The connections of the new pipework to the existing pipework shall only be carried out after the pipeline testing has been completed and accepted by the Engineer. For this reason, testing must be carried out against a blank flange, spade piece or bullnose end cap at these locations.

#### **PSL 7.3.7      Remedial Measures (New Sub-Clause)**

Add new Sub-clause:

In the event that a pipe section fails a test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of each individual section and the entire pipeline, at his/her own expense. Such remedial measures shall in no way compromise the original pipeline specifications.

#### **PSL 7.3.8      Draining Of The Pipeline (New Sub-Clause)**

Add new Sub-clause:

The pipeline may have to be drained to carry out remedial measures. The pipeline shall be drained via the scour valves in a manner that does not cause erosion of the streambeds or negatively impact on the environment in any way. All such drainage of the pipeline shall be carried out under the supervision of the Engineer.

All water to be drained after disinfecting the pipeline shall be discharged in a temporary portable holding tank to dilute the chlorinated water, if required. The tendered rates for pipeline testing and disinfecting is deemed inclusive of dichlorination agents and holding tank.

For pipelines of diameters where it is practically not possible to gain human access for inspection of the internal cleanliness of the pipeline, the Contractor shall ensure that any open ends are firmly closed

#### **PSL 7.5          COMMISSIONING (NEW SUB-CLAUSE)**

Add new Sub-clause:

The pipeline will be considered to have been commissioned and practically complete once all the associated structures are sufficiently complete to carry out their structural, hydraulic



and mechanical function and the hydraulic test and disinfection of the entire pipeline has been successfully completed.

The scheduling of commissioning requirements for the pipelines need to conform with the requirements as stated under section **PS 4.4** .

## **PSL 7.6 WATER TIGHTNESS TEST FOR CHAMBERS (NEW SUB-CLAUSE)**

Add new Sub-clause:

On completion of each concrete valve chamber, and prior to completion of the backfilling around the chamber, a water tightness test shall be undertaken by the Contractor. This shall be carried out by excavating a trench approximately 0,5 m deep around the periphery of the chamber and continuously (for at least 4 hours) maintaining it full of water. Should there be any noticeable leaks into the chamber, the Contractor shall carry out at his/her own expense whatever measures are necessary to waterproof the chamber to the Engineer's satisfaction.

## **PSL 8 MEASUREMENT AND PAYMENT**

### **PSL 8.2 SCHEDULED ITEMS**

#### **PSL 8.2.1 Supply, Lay And Bed Pipes Complete with Couplings**

Delete the sub-clause and substitute:

Supply, transport, lay, and bed pipes complete with couplings. .

Pipelines will be measured by length over all lengths as laid. No deduction will be made for specials and valves. Separate items will be scheduled for each diameter, type and class of pipe laid.

The rates tendered shall cover the cost of supplying, manufacturing, transportation of pipe to the work front, offloading and checking of the pipe for defects before placing, forming joint ("fox") holes in all excavated materials, setting out, installation, handling, laying and bedding.

Where joints of lengths of pipe (excluding joints to pipe specials) are concerned, separate payment items have been created for.

Notwithstanding the above, the rate for "supply, lay and bed pipes" excludes the cost associated with the field pressure testing and disinfection of the pipeline. Separate items have been included in the Bill of Quantities for the cost associated with pressure testing and disinfection of the pipeline.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under this item shall be deemed to include for all eventualities, covering steep grades, restricted access, confined spaces, high traffic volumes, working in road reserves, or whichever condition might present itself during construction to lay and bed the pipe.

Unit: m or E/O the linear metre rate, or by number as scheduled in the Bill of Quantities.

#### **PSL 8.2.1.1 Extra Over for Laying of Pipe under Powerlines and Servitudes (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality of working in the vicinity of existing services; overhead powerlines; pylon bases and pipelines including all relevant Health and Safety procedures and precautionary measures pertaining to working in the servitude or under or in close proximity of overhead powerlines shall be implemented, working in areas where pipe laying could be restricted to one length at a time.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the transportation of the pipe, the excavation and removal of spoil, the importation of bedding material, the laying of the pipe and all other associated activities that are impeded as a result of difficult access, and all other aspects that require consideration in order to lay and bed the pipe.

Unit: m

#### **PSL 8.2.2 Extra Over 8.2.1 For The Supplying, Laying And Bedding Of In Line Specials**

Add to Sub-Clause:

The rates shall cover the cost of supplying pipes and for fabricating and radiographic and/or hydraulic testing of bends, fittings specials, and supplying and installing flanges, couplings, valves and other appurtenances as scheduled, making good the coatings and linings, handling, inspecting, marking bends, fittings and specials with item numbers, transporting, holiday detection testing for coatings of steel pipes, forming joint ("fox") holes in all materials, off-loading, installing, bedding, laying, welding, jointing, cutting, all testing and disinfecting and where relevant all welding and the completion of the internal and external corrosion protection (make good) and jointing materials (e.g. nuts, bolts, washers, gaskets, welding rods etc.) and field wrapping to specifications where required for:

- a) In-Line Tees
- b) In-Line Reducers
- c) In-Line Elbows and Bends
- d) In-Line Flanges
- e) Bull Noses
- f) Segmented Bends
- g) Slip on flanges
- h) Other In-Line Specials such as spacers, spool pieces, stubs for air valves etc. as specified.

The rate will also be inclusive of gaskets, fasteners, washers, bolts, nuts, painting and field wrapping of joints.

All fabricated pipe specials to be marked with item numbers which correspond to test certificates. All items to be supplied with quality control documentation. Shop drawings of bends, fittings and specials shall be submitted to the Engineer for approval prior to manufacture.

**PSL 8.2.3 Extra Over 8.2.1 For Supplying, Fixing And Bedding Of Valves**

Add to the end of the sub-clause:

Valves shall be supplied against the required specification.

The prices tendered for supplying the pressure sustaining/pressure reducing valve and level control/flow control/pressure reducing valve assemblies shall cover all expenditure and everything necessary to be done by the manufacturer and supplier in order to comply with the requirements of the specifications, including attendance on site by a representative of the supplier for checking, commissioning, testing and demonstrating all in accordance with the specification and upholding insofar as supply of replacements for defective parts is concerned, all in accordance with the terms of the Contract.

**PSL 8.2.5 Supply And Installation Of Other Specials**

Valves shall be supplied against the required specification.

The rate shall cover the cost of fabrication, supply, installation, uplifting and transportation, off-loading, testing of all valves, cutting and welding, gaskets, jointing (e.g. nuts, bolts, washers etc), fasteners, NDT inspections, corrosion protective wrappings etc. and for internal and external coating and lining to project specifications.

The rate for the blank flanges must be inclusive of the specified gaskets, fasteners, washers, lining and painting. The rates for any test flanges must be inclusive of the blank flange, flanged connection, isolation valve, gasket and bolts, nuts and washers required to assemble test flanges and to attach test flanges to a flange.

All fabricated pipe specials to be marked with item numbers which correspondent to test certificates. All items to be supplied with quality control documentation.

**PSL 8.2.11 Anchor Blocks/Thrust Blocks And Pedestals**

Add the following:

The tendered rates shall cover the cost of formwork, concrete, reinforcement (if any), and screeding to top surfaces.

The tendered rate shall also include the wrapping of uPVC pipes and fittings with Densopol 80 or a similar approved material where the pipes and fittings come into contact with concrete.

Unit: m<sup>3</sup>

**PSL 8.2.15 Specials - Wrapping In Corrosive Soils**

Delete the heading and substitute:

Corrosion Protection

Delete the Sub-Clause and substitute the following:

The costs of making good the internal linings and external coatings on all butt welded and fillet welded joints on the pipeline are to be included in the tendered rates.

Add new items:

External corrosion protection to flanges, adaptor joints, valves: Separate items will be scheduled for each item by pipe nominal diameter. In the case of valves, the rate shall include for protection of the whole of the valve body, all flanges integral to the valve, the connecting flanges to the valve (i.e. including the two flanges of the pipework connected to either side of the valve) and the packing of mastic (without tape or sheathing) over the gland adjusting bolts and nuts.

Unit : No

#### **PSL 8.2.16 Pipeline Marker Posts**

Add new Sub-Clause:

Payment shall be per cost installed and shall include for the uplifting and transporting to site from the Municipal depot, handling, excavation, installation, backfilling and painting.

Unit: No

#### **PSL 8.2.17 Cutting Into Existing Steel Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing steel pipe, end preparation and making good of lining and coating.

The rate shall also cover preventing deformation of the ovality of the existing pipe once cut. All temporary or permanent supports are deemed to be inclusive in the rate for cutting of existing steel pipe.

The rate shall allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes. Rates are to include for: carefully exposing the existing pipelines, making arrangements with eThekwini's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

Loading and transporting removed sections to eThekwini water depot at Electron road, Springfield is covered elsewhere. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

#### **PSL 8.2.18 Cutting And Connecting To Existing AC Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing pipe and end preparation in accordance to Construction Regulations, 2014, Asbestos Regulations, 2001 and Environmental Management Plan, PEM 5.11 Hazardous Waste bound in the Document.

Allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes: Rates are to include for carefully exposing the existing pipelines, making arrangements with eThekwini's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing

the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

The transportation and disposal of all removed AC pipe must comply with environmental safe disposal regulations and be delivered to a hazardous materials spoil site for proper disposal. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

#### **PSL 8.2.19 Cutting Into Existing PVC Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing and end preparation.

The rate shall allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes. Rates are to include for: carefully exposing the existing pipelines, making arrangements with eThekweni's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

Loading and transporting removed sections to eThekweni water depot at Electron road, Springfield is covered elsewhere. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

#### **PSL 8.2.20 Meter Protection Sleeve**

The tendered rates shall cover the cost of all works required for the supply and installation of meter protection sleeve pipe as depicted on the drawings for Type 1 and Type 2.

Unit: No

#### **PSL 8.2.21 Hydraulic Testing (New Sub-Clause)**

Add new Sub-Clause:

The rates shall cover all the cost of all the required materials, equipment, connections, personnel and procedures for filling, testing and draining of the pipeline where required, or sections of the pipeline during hydrostatic testing. The rates shall cover the cost of the water required for hydrostatic testing.

#### **PSL 8.2.22 Preparation and welding of bell ended joints in Pipeline (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall include in his rate for welding of straight joints (butt welding for plain ended pipes and fillet welding for bell ended pipes) in pipelines, the supply of materials, labour, plant, equipment and supervision required at each joint.

The Contractor shall include in his rate for welding of straight joints in pipeline, the supply of all materials, labour, plant, equipment, supervision, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification, required at each joint.

Unit: No

#### **PSL 8.2.23 Preparation and welding of single mitred joint in pipeline**

Add new Sub-Clause:

The Contractor shall include in his rate for preparation of single mitres in order to effect a mitred joint in terms of the construction drawings, the welding of the single mitred joint in pipeline, the supply of materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

Bell ended joints with directional change shall be tendered for under this item

Preparation and welding of single mitred joints in pipeline, refer to PSL 3.4.4.2.

Unit: No.

#### **PSL 8.2.24 Preparation and Welding Collar Welded Joints in Pipeline**

Add new Sub-Clause:

The Contractor shall include in his rate for welding of collar welded joints in pipelines, the supply of all materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

The tendered rate shall include for both fillet welds, one on each side of the collar. A collar welded joint shall be counted as one joint and not two as a result of the 2 fillet welds required to complete the joint.

The collars/ bands shall have a minimum width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes

Welding of collar welded joints in pipeline (Diameter Nominal specified) (Provisional Quantity)

Unit: No

#### **PSL 8.2.25 Preparation by means of cutting**

The rates tendered shall cover the cost of supply and installation of all materials, equipment, procedures and personnel to carry out cutting of steel pipe where directed by the engineer, for the installation of same, under conditions where dense services requires the laying of pipe in shorter than standard lengths. the rate for cutting shall include for internal lining and coating repair (Provisional quantity).

**PSL 8.2.26 Cathodic Protection**

This work is to be done by a Nominated Sub-Contractor. The Civil Contractor is to liaise & cooperate with the CP specialist to ensure that the activities of the specialist proceed in the best possible manner.

Precise details of the location of elements of the Cathodic Protection System will be confirmed by the Engineer's Instructions on site, but the following points are noted:

- a) Continuity bonding is required around all in-line valves.
- b) Monitoring test points are to be installed in the line valve chambers, where shown.

**Insulating flanges are required at all inlet and outlet pipe positions.**

Unit: No

**PSL 8.2.27 Laying of Pipe Through Drilled Sleeves (New Sub-Clause)**

Add new Sub-Clause:

The rates tendered shall cover the cost of supply, setting out, installation, handling, cutting to closures and preparing ends for welding of joints, laying true to line and level on prepared trench bed., the careful feeding of pipe into and through the horizontally direction drilled sleeve, any cutting, welding and joint repair that is required to feed the pipe into and through the jacked sleeve.

Unit: m

**PSL 8.2.28 On site external tape wrapping and internal lining repair of welded joints in pipeline (New sub-clause)**

Add new Sub-Clause:

The Contractor shall include in his rate for the supply of all materials, labour, plant, equipment, supervision and QQA/QC for on site external tape wrap and internal lining repair in terms of the specification, of straight butt welded joints and butt welded single mitred joints as well as straight and single mitred joints in bell ended pipe or pipe jointed by welded collars.

On site external tape wrapping and internal lining repair of welded joints in pipeline (specified by nominal diameter)

Unit: No

**PSLB BEDDING (PIPES) (SABS 1200 LB – 1983)****PSLB 2.3 DEFINITIONS**

Main fill:

Delete "150 mm" in second line and substitute "300 mm".

**PSLB 3 MATERIALS****PSLB 3.1 SELECTED GRANULAR MATERIAL**

Delete the Sub-clause and add the following:

All the material to be used for the bedding material (that is for the cradle and the blanket material) surrounding the pipe, shall fall within the following requirements.

**GRADING ANALYSIS RANGE**

SIEVE SIZE (mm)	PERCENTAGE PASSING
9,5	100
6,7	98 to 100
4,76	85 to 100
2,36	55 to 95
1,18	30 to 75
0,60	20 to 50
0,425	16 to 38
0,30	13 to 27
0,15	5 to 18
0,075	0 to 12

The material shall be free of organic matter and shall have a compactibility factor of not more than 0.4. The material should be classified as silty to fine sand having a stiffness ratio of not less than 5,0 MPa. Furthermore, the origin of the materials should, preferably, be river transported since it is preferable that the larger grains (3,0 to 6,7 mm in size) be rounded and not sharp and angular.

The Contractor shall be required to supply samples of the sand to be used as bedding material, to the Engineer for approval, 5 days before use. Only after the Contractor has received written approval from the Engineer, may he proceed with placing sand as selected granular material.

The Contractor shall carry out his own quality control testing of the granular bedding materials to ensure that it meets the specification.

The Contractor shall be required to supply samples of the sand to be used as bedding material, to the Employer's Representative for approval. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing sand as selected granular material.

The Contractor will carry out his own quality control testing of the bedding material to ensure that it meets specification. At least one grading analysis should be carried out for every 250m of pipeline installed. The results of these tests must be given to the Employer's Representative within 24 hours of completion of the test.



If any material used in the bedding of the new pipes is found to be outside the specification, the Contractor will remove and replace this material with approved sand at his own cost.

## PSLB 3.2 SELECTED FILL MATERIAL

Delete and replace with:

Imported selected fill material shall have a PI not exceeding 6 and shall be free of vegetation, lumps and angular stones. Maximum particle size shall be 19mm with at least 60% passing the 6.75mm sieve.

The material shall be granular and non-flaky and shall contain no organic matter. It shall have a PH greater than 5.5 and shall not cake or form lumps when drying out. The material obtained from the trench excavations might generally be suitable for use as selected fill material which is placed above the Selected Granular Material bedding to the pipe.

Several conditions for the placement of the selected fill material have been identified and will require separate treatment in the field as and when these arise:

### **Pipeline to be constructed beneath existing road.**

In this case the selected fill material shall be taken to the underside of the proposed new layerworks construction where the new road will match the existing road layers or will be constructed to a new design specification. In this case the selected fill material will be placed from the top of the pipe bedding to the bottom of road subgrade level and compacted to minimum 97% Mod AASHTO density. Thereafter the structural road layers will be constructed. This procedure is necessary to limit settlement beneath roads.

### **Pipeline to be constructed in open field, pipeline/road reserves or rural areas under no traffic conditions.**

In this case the settlement of the trench outline is not a critical issue and construction of the pipe will proceed with normal **backfill material (PSDB 3.5)** placed over the selected granular bedding material as specified elsewhere in this document. The normal backfill over the selected granular material will be taken to the top of the trench at ground surface where it will be built proud by up to 100 mm of the surrounding ground surface. Placement of the normal backfill material to ground surface level will be carried out in layers maximum 300mm loose thickness. Compaction will be minimum 95% Mod AASHTO,

### **Pipeline to be constructed in trench excavated entirely in bedrock.**

In this case the selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be taken to the top of the trench at ground surface where it will be built proud by up to 200 mm of the surrounding ground surface. This procedure is required to prevent preferential erosion paths or gulleys forming on the trench line as would be the case with normal (unstabilised) backfill within the trench with shallow bedrock sides.

### **Pipeline to be constructed on steep slopes where the natural gradient exceeds 1V:3H.**

This case is similar to (iii) above where it is necessary to limit or prevent preferential erosion over the trench outline. The selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness maximum 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be

taken to within 200mm of the top of the trench at ground surface. This upper 200mm will be placed with organic rich topsoil from stockpile for re-vegetation.

Depending on the Engineer's assessment either the full length of trench along the steep section or only limited sections not less than 3 metres at intervals of 15 metres along the trench line may be treated in this way. Depending on the assessment of the erodibility potential of the insitu and backfill soils by the Engineer sections of pipeline running down slope in areas flatter than 1V:3H may also require this treatment.

### **PSLB 3.3 BEDDING**

Add the following to Sub-Clause:

Steel pipelines shall be bedded as per Drawing LB-3 (d) of SABS 1200LB where the cradle material and the blanket material up to 300mm above the crown of the pipe, consists of selected granular material.

Portions of the pipeline may warrant the need for soilcrete and will be prepared, placed and compacted as per the relevant drawings.

Concrete stormwater pipes are to be regarded as rigid and shall have Class C bedding as per drawing LB-3 of SABS 1200 LB. Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

All subsoil pipes shall be bedded in accordance with the typical details shown on the relevant drawings.

Bedding materials (for cradle and blanket material), such as Umgeni River sand or similar approved non-cohesive materials shall be compacted to 100% Mod. A.A.S.H.T.O. either by full saturation or mechanical means or a combination of both, approved by the Employer's Representative.

The Contractor will be required to supply samples to the Employer's Representative of the bedding material to be used in the cradle as well as for blanket material, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing of selected granular material bedding.

Should the Contractor change the source of the bedding material, samples of the proposed material shall be supplied to the Employer's Representative, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing of the new selected granular bedding material.

The costs for the grading analysis tests shall be included in the tendered rates for the supply, placement and compaction of the selected granular material.

### **PSLB 3.4 SELECTION**

Add to Sub-Clause:

Notwithstanding the requirements of sub-clause 3.7 of SABS 1200 DB and sub-clause 3.4.1 of SABS 1200 LB regarding the use of selective methods of excavating, the Contractor shall use selective methods of excavating and shall provide and use plant that will enable him to avoid burying or contaminating material that is suitable and is required for bedding.

**PSLB 3.4.1 Suitable Material Available From Trench**

Replace the words “(but is not required)” in the fifth line with the words “at his own cost”.

**PSLB 3.4.1.1 Selected Excavation (New Sub-Clause)**

Add new Sub-Clause:

The Contractor is required to excavate selectively for bedding materials and selected fill materials.

**PSLB 3.4.3 Crushed Stone Bedding (New Sub-Clause)**

Add new sub clause:

Where the conditions on the trench bottom are too wet to use selected granular material as this would not be practical, 19mm single sized crushed stone material from commercial sources will be used to form a pioneer layer. Depending on conditions to be assessed by the Engineer, dump rock might be instructed as a base for the 19mm stone pioneer layer. This will involve the use of geotextile material as instructed. The use of stone as a pioneer layer is only applicable after approval of the Engineer.

**PSLB 5 CONSTRUCTION****PLSB 5.1 GENERAL**

Add to sub clause:

The determination of pipe as “flexible” or “rigid” will be according to the procedure given in section 4.5 of Part 1 of SANS 0102.

**PSLB 5.1.2 Details Of Bedding**

Delete and replace with:

The cradle thicknesses shall be as follows:

For DN600 and smaller

- Cradle thickness to be 100mm

For greater than DN600

- Cradle thickness to be 300mm

The blanket material thickness above the crown of the medium pressure pipe shall be 300mm for all diameters of pipe.

Steel pipelines treated as slender or flexible pipe shall be bedded as per Drawing LB-3 (d) of SABS 1200LB.

PVC and HDPE pipes shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-3-(d) of SABS 1200LB.

Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

**PSLB 5.1.2.1 Stone drainage layer beneath bedding (New sub-clause)**

Add new Sub-Clause:

Where indicated on the drawings, or as otherwise indicated by the Engineer, a 200mm thick layer of 19mm stone shall be placed beneath the bedding layer to act as a drainage channel for excessive ground water. This layer shall be wrapped in an approved geotextile and provided with outlet pipes where indicated on the drawings or as directed by the Engineer, so as to drain away from the pipeline any excess water that accumulated in the trench. The Contractor shall ensure that all the stipulations for handling of ground water in any sub-surface drain are adhered to. Should conditions on site be such that the design does not cater for the specific condition encountered, he shall immediately resort to seeking the advice from the Engineer. The Contractor must be aware that the handling of sub-surface water and the drainage there of is an environmentally sensitive issue.

The Contractor's attention is drawn to the fact that the installation of sub-soil drains will be as per the direction of the Engineer and will only be required after the Engineer has done an inspection in order to assess the suitability of a specific type of sub-soil drain and has approved of the same.

**PSLB 5.1.3 Placing Of Bedding**

Add to Sub-Clause:

No loose rocks or stones shall be permitted to rest against the pipe barrel during the placement and compaction of the bedding cradle or blanket. In addition to the provisions of clause 5.1.3.3, hand equipment shall be used to compact the bedding material under the haunches and immediately next to the pipe. No vibratory mechanical equipment shall be allowed to make contact with any part of the pipe or be used on the bedding blanket directly above the pipe.

End tipping of bedding directly into trench will not be allowed.

**PSLB 5.1.4 Compaction**

Delete and replace with:

For continuously welded steel pipelines of diameter DN600 and above, the bedding is to be compacted to 100% MOD AASHTO. For flexible pipes the drawing LB – 3(d) in SABS 1200 LB is applicable.

Compaction for smaller diameter steel pipelines and pipelines of other materials, the compaction density shall be in terms of the requirements on the drawings. Non flexible pipes shall consist of a class C bedding whilst flexible pipes shall be deemed to have been priced for bedding placement in terms of drawing LB – 3(d) in SABS 1200 LB.

The Contractor shall take steps to ensure that flexible pipes do not deform excessively in cross-section during and after construction and backfilling operations. The maximum deflection which will be acceptable at any stage during or after construction is 5% of the pipe diameter horizontally or vertically. The Contractor will be required to provide the necessary apparatus and to monitor deflection during construction.

Pipe deformations will only be maintained within the specified tolerances by correct backfilling practice. No heavy compaction equipment will be permitted for compaction of any pipe bedding, only pneumatic or hand rammers being acceptable. To this end, and to achieve the required compaction specified it is required that the bedding material be brought up evenly on either side of the pipe. The use of complete saturation of the material as a method of achieving the specified compaction may, subject to the Engineer's approval, be used. However, in this regard, contractors are advised that the presence of excessive

quantities of water in the pipe trench could lead to flotation of the pipe. It is the duty of the Contractor to ensure that pipelines do not float in the bedding material during construction.

Prior to the commencement of pipe laying the Contractor shall submit, to the Engineer for approval, the placing and compacting methods which he proposes to implement in order to ensure compliance with the specification.

Blanket material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 200mm measured loose and compacted to the required density utilising the required compaction method. Movement and deflection of the pipe shall be avoided.

Particular attention shall be paid to compaction of material in the pipe haunch area. Compaction shall be achieved by hand punning horizontally and obliquely with a suitably sized and shaped hand tool. The Contractor shall take the necessary precautions not to inflict damage to the pipeline coating when compacting the cradle and the blanket material.

All costs for providing the water required for the saturation of the material, temporary retaining measures to prevent backfill material from “ flowing “ away from point of application, and or retaining measures to terminate a specific backfill section for whatever reason, shall be deemed to be included in the tendered rates for supply, place and compact of bedding material.

Some materials such as decomposed granite and dolerite may have inherent radioactive mineralogy which may affect the accuracy of the compaction monitoring results when the nuclear density meter method is used to measure compactions. Where such mineralogy results in both erratic and inconsistent measurements it may be necessary as determined by the Engineer, to resort to the standard or reference method of soil density measurement which is the sand replacement test.

The Contractor shall carry out his own quality control testing of the proposed bedding material to ensure that it meets this specification.

At least one grading analysis should be carried out for every 250 metres, per layer, of bedding placed. The results of these tests shall be forwarded to the Engineer within 24 hours of completion of the test. Should the material not comply with the specification, the Contractor shall remove and replace material not complying with the specification, with approved material, at his own cost.

Should the Contractor change the source of the bedding material, or should the bedding material come from a new location within a quarry, samples of the proposed material shall be supplied to the Engineer, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Engineer, may he proceed with placing of the new selected granular bedding material.

The costs for the grading analysis tests shall be included in the tendered rates for the supply, placement and compaction of the selected granular material.

No extra payment will be made for forming or filling joint holes (pockets).

#### **PSLB 5.1.5 Testing (New Sub-Clause)**

Add new sub clause:

Flexible and flanged joints shall be left exposed with a minimum of 300 mm clearance around the bottom of the pipe during hydraulic pressure testing of the pipe to facilitate inspection.

**PSLB 5.2 PLACING AND COMPACTING OF RIGID PIPES****PSLB 5.2.2 Class 'C' Bedding**

Delete the third, fourth and portion of the fifth lines of the Sub-Clause and substitute the following:

"The pipes shall be bedded on a layer of compacted granular bedding material on which a 25mm thick layer of uncompacted granular bedding material has been placed and spread. Loose granular bedding material lying next to the pipe shall be placed into the haunch area and compacted with suitable hand tools, and additional selected granular material shall be added and compacted in layers until levels for the bedding cradle as shown on Drawing LB - 1 (c) are reached. The remainder of the bedding i.e. the selected fill blanket, shall be placed in layers up the sides of the pipe, each layer being compacted until levels are reached as shown on Drawing LB-1 (c)."

**PSLB 7 TESTING**

Compaction testing shall be executed at least every 15m to 25m for every layer but the Contractor needs to establish a test regime more stringent than the stated should he require this for quality assurance. This shall include bedding and selected or common fill layers above the bedding layers.

**PSLB 8 MEASUREMENT AND PAYMENT****PSLB 8.1 PRINCIPLES**

All rates provided for bedding placement and compaction shall be deemed inclusive of all machinery and plant required to work under all width conditions. For this purpose, rates for trench compaction shall include for narrow width compaction with suitable compaction equipment and machinery. On the opposite end of the scale, compaction rates for, for example, road layer works, shall be fully inclusive of the typical plant and equipment used for road layer works.

**PSLB 8.1.1 Supply Of Bedding Materials Separately**

Add to sub clause:

The measurement of bedding shall be the total through length along the centre of the pipeline measured horizontally with deductions made for the line valve chamber.

**PSLB 8.1.3 Volume Of Bedding Materials**

Add to Sub-Clause:

The volume of bedding material shall be measured nett i.e. the volume of the pipe and inline valve chambers is to be deducted.

The tendered rate for bedding shall not be re-negotiated as a result of a change in supplier.

**PSLB 8.1.4 Separate Items For Cradle And Blanket**

Delete Sub-Clause and replace with:

Separate items are scheduled for material for the bedding cradle and for the bedding blanket material, to provide for the probability that the excavated material from the trench is more likely to comply with the requirements for the latter than the former.

The tendered rates for the supply of cradle and blanket material shall include for the supply of same at all grades and no additional financial compensation for the supply of bedding at steep grades will be considered.

#### **PSLB 8.1.5 Disposal Of Displaced Material**

Delete the first sentence and replace with:

Material displaced by the pipeline and by importation of material from sources other than trench excavation, shall be disposed of offsite to an approved spoil disposal site. No additional payment for such disposal will be entertained.

No overhaul shall be paid.

#### **PSLB 8.1.6 Free Haul**

Delete the Sub-Clause and substitute the following:

All haul will be regarded as free haul. No overhaul will be paid for under this Contract.

### **PSLB 8.2 SCHEDULED ITEMS**

#### **PSLB 8.2.1 Provision Of Bedding From Trench Excavation**

Delete the Sub-Clause and substitute the following:

Without the need for screening:

- |     |                            |                       |
|-----|----------------------------|-----------------------|
| (a) | Selected granular material | Unit : m <sup>3</sup> |
| (b) | Selected fill material     | Unit : m <sup>3</sup> |

The rates shall cover the cost of acquiring along the trench excavation as may be selected by the Engineer, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, of making good any backfill deficiency from points where backfill has been acquired, and of disposing of displaced material.

The rate for the supply and laying of pipelines covers the cost of handling the bedding material from alongside the trench, placing it under the pipeline, filling of joint holes and completing the bedding around and over the pipeline, as well as placing of selected fill material.

##### **PSLB 8.2.1.1 Extra over item PSLB 8.2.1 for screening (New sub-clause)**

Add new Sub-Clause:

The unit measurement shall be cubic metre (m<sup>3</sup>).

The rates shall cover the cost of screening or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Representative, in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench, spaced to suit the Contractor's methods of working, of making good any backfill deficiency there may be from points where screened backfill material has been acquired.



The rate provided against the volumetric unit shall be applicable to the volume of material produced in terms of the required specification and not the volume of material screened in the first instance.

#### **PSLB 8.2.2 Supply If Bedding By Importation**

Delete the sub-clause and substitute the following:

Including for screening and/or other treatment:

- a) Selected granular material Unit : m<sup>3</sup>
- b) Selected fill material Unit : m<sup>3</sup>

The rates shall cover the cost of acquiring, loading, transporting, offloading, screening or otherwise treating excavated material in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench spaced to suit the Contractor's methods of working and of disposing of displaced material.

**NOTE:** The rate for the supply and laying of pipelines covers the cost of handling the bedding material from alongside the trench, placing it under the pipeline, forming joint holes and completing the bedding around and over the pipeline.

#### **PSLB 8.2.2.3 From commercial sources**

Delete the Sub-Clause and substitute the following:

Material measured under this item to be sourced from commercial sources by Contractor.

- a) Selected granular material Unit: m<sup>3</sup>
- b) Selected fill material Unit: m<sup>3</sup>

The rates shall cover the cost of acquiring, loading, transporting, and, offloading in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench spaced to suit the Contractor's methods of working and of disposing of displaced material. No overhaul shall apply.

#### **PSLB 8.2.4 Encasing Of Pipes In Concrete**

Add to Sub-Clause:

The rate for concrete encasing shall include for the supply, installation and stripping of all formwork.

Where river crossings are applicable and the drawings specify concrete encasement with stone pitching, the rate for concrete encasing shall include for such stone pitching stone which is retrieved from pipe trench excavations in the vicinity of the river crossing or retrieved from the immediate area.

Expansion/contraction joints to be as instructed by the Engineer.

#### **PSLB 8.2.6 Drainage Layer (New Sub-Clause)**

- a) Supply and place stone filling beneath pipe Unit : m<sup>3</sup>

The rate shall be for a 150mm deep crushed stone layer as ground water drainage measured according to a width equal to the base widths. The excavation for these drains



will be measured in cubic metres at the tendered rate applying to unsuitable excavation below the bottom of the trench (SABS 1200 DB 8.3.2 c).

b) Supply and installation of geofabric filter material

(BIDIM Grade A4 or similar) around stone

Unit : m<sup>2</sup>

The rate shall be per square metre of geofabric to enclose the stone material, measured net according to a width equal to the base widths and depths ordered.

**PSLC CABLE DUCTS (SABS 1200 LC)****PSLC 3 MATERIALS****PSLC 3.1 DUCTS**

Add the following to Sub-Clause:

Ducts for cables shall comply with SANS 61386-24. The pipe diameters shall be as scheduled in the Bill of Quantities and drawings. Normal duct class with spigot and socket rubber ring joints. Both ends of each duct must be sealed with an end cap. The pipe cable ducts shall be

- SANS 791 Class 34 (Heavy Duty) for cast into concrete structures and/ or buried or
- HDPE "Kabelflex" or similar approved for buried installations.

Ducts for relocated or new telephone cables shall be 110mm dia. uPVC coreflow pipes as provided by Telkom.

**PSLC 3.4 CABLE DUCT MARKERS**

Add the following to Sub-Clause:

The end of each cable duct installed shall be marked with a cable duct marker as indicated on the relevant drawings

Further to the above "record" information giving exact co-ordinates and levels at each end of a duct and the size of duct laid at each road crossing shall be supplied to the Engineer in writing or electronically in the format specified within one week of installation. The above shall be included in the rates for cable duct markers."

**PSLC 5 CONSTRUCTION****PSLC 5.1 EXCAVATION OF TRENCHES**

Add to Sub-Clause:

All ducts shall be laid with a minimum of 800mm cover under roads and shall extend to within 0.1 m of the position provided on the drawings or at least 500mm beyond the kerb line. Where paved footpaths are present or are to be provided in the future the ducts shall extend at least 500mm beyond the paved footpath.

All excavation quantities for cable ducts are measured under PSDB.

**PSLC 5.3 DUCT LAYING****PSLC 5.3.3 Draw Wire**

Add the following to Sub-Clause:

The ends of all cable ducts shall be sealed using suitable end caps.

**PSLC 5.9 DUCT ROUTE MARKERS**

Add to Sub-Clause:

The tendered rates shall include for providing the Engineer with the record information and supplying and installing the markers as specified under PSLC 3.4. This information is required by the relevant service authorities.

## **PSLC 8 MEASUREMENT AND PAYMENT**

### **PSLC 8.2.2 Excavation**

Add to Sub-Clause:

Measurement for cable ducts will be done under PSDB – Measurement

### **PSLC 8.2.5 Supply, Lay, Bed And Prove Duct**

Delete Sub-Clause a) and b) and replace with:

#### **PSLC 8.2.5(a) Telkom ducts**

Delete Sub-Clause and replace with:

All pipes, draw wire, screen wire and duct markers will be supplied by Telkom to the construction site at no cost to the Contractor. All ducts shall have a minimum cover of 600mm from finished road level to the top of the pipe. All ducts are to extend 1 000mm either side of the road edge. Trench width for single and double pipes shall be 375 mm and 450mm respectively.

The tendered rate shall include full compensation to install the ducts as specified. Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be

Unit: m

#### **PSLC 8.2.5(b) Electricity ducts**

Delete Sub-Clause and replace with:

The ducts shall consist of the indicated number and size as specified in the Bill of Quantities. All ducts are to be laid at 800mm below finished road level and the pipe must protrude 500mm into the footpath or road verge on either side. Both ends of each duct must be sealed with an end cap. In addition it is essential that the location of the ducts must be marked on site and to facilitate subsequent location, suitable kerb or markers shall be obtained from the Service Units Depot. These kerbs or markers will be supplied free of charge.

The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified. The tendered rate shall include for obtaining the kerbs or markers from the Service Units Depot and placing them where required.

Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be.

Unit: m

**PSLC 8.2.5(c) Water ducts (New sub-clause)**

Add new Sub-Clause:

The ducts shall consist of the indicated number, class, material and size as specified in the Bill of Quantities. Ducts shall have a minimum cover of 600mm and a maximum cover of 800mm measured from the top of the kerb. The duct shall be stenciled with 40 mm letters in blue paint on the kerb or road edge as follows : W DUCT. Ducts shall extend at least one metre past the line of the future water main trench and at least 1.5m from the edge of the road on the opposite side of the road. The ends of the ducts shall be blocked off with an end cap to prevent the ingress of soil.

An 8 gauge galvanised wire shall be drawn through the ducts and secured to wooden stakes located approximately 150mm off the cadastral boundary on either side of the road. The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified.

Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be

Unit: (m)

**PSLC 8.2.8 Cable Markers**

Add to Sub-Clause:

a) Cable duct markers

Unit: No

**PSLC 8.2.10 Construct 450mm By 450mm Precast Portal Culvert For Telkom Fibre Optic Protection Complete With Excavation And Backfill – 0.0m To 1.0m Depth**

Add new Sub-Clause:

The unit of measure shall be the linear metre measured along the soffit of the precast portal culvert installed.

The rate shall cover the cost of supplying, testing, loading, transporting, and off-loading together with provision and placing of the selected granular material where required for bedding and installation, laying, jointing, cutting on site, and waste.

The rate shall also cover the necessary excavation, backfilling and precautionary measures required for the installation.

Unit: m

**PSLD SEWERS (SABS 1200 LD – 1982)****PSLD 3 MATERIALS****PSLD 3.1 PIPES, FITTINGS AND PIPE JOINTS****PSLD 3.1.5 Upvc Pipes**

Amend the following:

uPVC Class 34 heavy duty pipes shall comply with SANS 791 and the relevant SABS Standards and shall be approved of by the Employer's Agent prior to procurement.

**PSLD 3.5 MANHOLES, CHAMBERS, ETC****PSLD 3.5.7 Step Irons**

Replace sub-clause with the following:

Calcamite step irons or similar approved by Employer's Representative, to be used.

**PSLD 3.5.8 Manhole Covers And Frames**

Add the following:

Manhole covers and frames to be heavy duty and lockable.

**PSLD 3.5.9 Manhole Covers And Frames**

Add new sub-clause:

Precast concrete manholes to comply with SANS 1294.

**PSLD 5 CONSTRUCTION****PSLD 5.6 MANHOLES, INSPECTION CHAMBERS, ETC****PSLD 5.6.3 Step Irons**

Add the following:

Step irons to be driven into pre-drilled 25mm diameter by 75mm deep holes and fixed with Lokset S 40 or similar approved.

**PSLD 5.7 CONCRETE CASING TO PIPES**

Add the following:

All sections of the pipe to be concrete encased is to be approved by the Engineers Representative. Pipes to pass the water test and to be filled with water prior to encasement.

**PSLD 7      TESTING****PSLD 7.1      GENERAL****PSLD 7.1.6      Replace With The Following:**

The Contractor is to provide a method statement detailing the test procedure which is to be approved of by the Employer's Representative.

The required test pressure for all pipelines shall be 1250 KPa measured at the lowest point of the pipeline(s) with a maximum elevation difference of 10 metres and maximum horizontal distance of 500 metres between pressure test points.

All costs relating to this work inclusive of water required for testing, scouring, supplying and install blank flanges, spade pieces etc are to be included in the rate for testing. The duration of this test will be minimum of 1 hour.

The pipe section shall not be filled until associated structural concrete has cured for 28 days and attained design strength and all permanent anchors and fasteners are in place.

The pipe shall be filled at a rate that permits the escape of air and does not induce transient pressure surges.

Permissible leakage for pipe = 0 litre/m.

In the event that a pipe section fails the test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of the section at his own expense.

**PSLE        STORMWATER DRAINAGE (SANS 1200LE)****PSLE 3        MATERIALS****PSLE 3.1(A)    Precast Concrete Pipes**

Delete Sub-Clause and replace with:

Concrete pipes shall be of reinforced concrete and shall comply with SANS 677 and be of the class as indicated on the drawings or scheduled in the Bill of Quantities.

**PSLE 3.1 (d)    Skewed ends**

Add to the Sub-Clause:

Wherever required skew ends may be cut on site.

**PSLE 3.1 (f)    Pipes for subsoil drains (New sub-clause)**

Add new Sub-Clause:

Pipes for subsoil drains shall have the specified internal diameter, which shall not be less than 100 mm, and shall be slotted uPVC or HDPE pipes with a wall thickness in accordance with Class 4 pressure pipes to SANS 966.

The size of the perforations in perforated pipes shall in all cases be 8 mm + 1,5mm diameter and the number of perforations per metre shall not be less than 26 for 100 mm pipe and 52 for 150 mm pipe. Perforations shall be spaced in two rows for 100 mm pipes and four rows for 150 mm pipes.

Slotted uPVC or HDPE pipes shall have a slot width of 8 mm with a tolerance of 1,5mm in width. The arrangement of slots shall be to the Employers Agent's approval, but the total slot area shall not be less than specified for the perforations.

**PSLE 3.1 (g)    Upvc Pipes**

Add new Sub-Clause:

uPVC Class 34 heavy duty pipes shall comply with the relevant SABS Standards and shall be approved of by the Employer's Agent prior to procurement.

**PSLE 3.4.1    Bricks**

Add to Sub-Clause:

Cement bricks complying with the relevant requirements of SANS 1215 bricks shall be considered as being acceptable.

**PSLE 3.4.3    Manhole Covers, Grid Inlets, Etc.**

Add to Sub-Clause:

All cast iron fittings shall receive the following corrosion protection:

One coat epoxy zinc chromate oxide primer to SANS 929. The Dry film thickness to be 35 microns. The final two coats to be epoxy tar in different colours, the final coat to be black.

The Coating time to be as per the manufacturer's instructions. The Dry film thickness to be 225 microns.

**PSLD 3.5 MANHOLES, CHAMBERS, ETC**

**PSLD 3.5.7 Step Irons**

Replace sub-clause with the following:

Calcamite step irons or similar approved by Employer's Representative, to be used.

**PSLD 3.5.8 Manhole Covers And Frames**

Add the following:

Manhole covers and frames to be heavy duty and lockable.

**PSLD 3.5.9 Manhole Covers And Frames**

Add new sub-clause:

Precast concrete manholes to comply with SANS 1294.

**PSLE 3.6 CONCRETE (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Concrete shall comply with the relevant requirements of SABS 1200 G or SABS 1200 GA, whichever is included in the project specification.

**PSLE 3.7 PERMEABLE MATERIAL FOR GROUNDWATER DRAINS**

Delete Sub-Clause and replace with:

Permeable filter materials for groundwater drains shall consist of crushed stone of suitable gradings.

Permeable materials shall conform to the following requirements:

- Crushed stone shall be clean, hard single sized stone and shall be free from shale, clay and other deleterious substances.
- The aggregate crushing value of the stone shall not exceed 30 when tested in accordance with TMH 1 Test Method B1.

**PSLE 5 CONSTRUCTION**

**PSLE 5.3.1 Culvert Construction After Earth Fill (New Sub-Clause)**

Add new Sub-Clause:

Wherever possible pipes and rectangular culverts shall be laid under trench conditions. The compacted fill shall first be constructed to a height of 300 mm above the culvert before excavating for the culvert.

The trench width shall not exceed the outside diameter of the pipe plus 600 mm. A working width of 600 mm each side shall be allowed for rectangular culverts.



**PSLE 5.2.2 Pipe Culverts**

Add to Sub-Clause:

The bedding for stormwater pipes shall be to the requirements for Class C bedding of SABS 1200 LB, unless otherwise specified or shown on the drawings.

The ogee joints shall be fitted with 200 mm x 6 mm rubber sealing collars conforming to the latest SANS 974 Specification and with a shore hardness of approximately 40 degrees, or alternatively, the ogee joints shall be primed and double wrapped in accordance with the manufacturer's recommendations with 200 mm wide wrapping tape type CDP or similar approved.

**PSLE 5.2.3 Concrete casing of pipelines**

In second line of the Sub-Clause substitute "Grade 15/19" for "mix 15".

**PSLE 5.2.6 Construction of Groundwater Drains (New Sub-Clause)**

Add new Sub-Clause:

On completion of excavation the trench shall be lined with geotextile as specified or shown on the drawings.

A layer of permeable material of the class and thickness as shown on the drawings shall be placed on the bottom of the trench and lightly tamped and finished to the required gradient.

Pipes of the type and size required shall then be firmly bedded on the permeable material true to level and grades coupled where required and the trench backfilled in layers not exceeding 100mm with further permeable material to such height above the pipes as shown on the drawing or directed by the Engineer. The permeable material shall be lightly compacted and finished to the required level. The trench must be specially protected against the ingress of water before completing the impermeable layer.

When placing successive layers the lower layer must not be walked on or disturbed more than can be avoided. Care shall be taken to prevent the contamination of permeable material during construction of the groundwater drains and all permeable material contaminated by soil or silt shall be removed and replaced by the Contractor at his own expense.

Where plain butt joint pipes are used they shall be laid firmly together to prevent infiltration of backfill material. Perforated and slotted pipes shall be joined by couplers. Perforated pipes shall be laid with the perforations at the bottom, as instructed.

The higher end of groundwater pipe drains shall be sealed off with a cap or loose concrete cap of Class 20/19 concrete, as shown on the drawings, and at the lower end the pipe drain shall be built into a concrete headwall providing a positive outlet or connected to stormwater pipes or culverts

**PSLE 5.8 OPEN DRAINS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Open drains are to be constructed to the details shown on the drawings, or as directed by the Engineer, to the correct line, level and cross-section. The material excavated from open drains is to be stockpiled for future cover.

Measurement of open drain excavation shall be calculated from natural ground level or, in the case of drains within a road reserve, from the reduced level in the road excavation, and payment will be made on a rate per m3 basis irrespective of depth. The rate is to include for all work required to trim the drain(s) to the correct line and level.

## **PSLE 5.9 STONE PITCHING (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Where ordered by the Engineer, open drains, stormwater outlets, etc, shall be pitched with stone. Stone for pitching shall be of good, sound, durable rock of good shape and face, with a minimum size of 100 x 100 x 75 mm deep. Before pitching is commenced, all slopes and surfaces to receive pitching shall be carefully trimmed and dressed to the correct lines and grades. The pitching stones are to be laid with joints broken as much as possible and are to be hammered solid into position to present a regular and uniform surface. All joints are to be grouted to their full depth in 4:1 cement mortar.

Payment for stone pitching will be made at a rate per unit finished area and the rate is to include for all trimming and dressing of the excavation, laying of the stones and grouting of the joints :

Unit : m<sup>2</sup>

## **PSLE 5.10 CUTTING OF DRAINAGE PIPES (NEW SUB-CLAUSE)**

Add new Sub-Clause:

As far as possible, culvert lengths shall be such that pipe units need not be cut. Should any straight or skew cuts be necessary, such cutting will not be measured and paid for separately in terms of Sub-Clause 8.2.4 since all additional work required in cutting the pipes as well as the wasted pipe ends shall be regarded as being included in the payment for the supply, lay, joint, bed and test of the relevant pipe culverts, as per Sub-Clause 8.2.1.

## **PSLE 8 MEASUREMENT AND PAYMENT**

### **PSLE 8.2 SCHEDULED ITEMS**

#### **PSLE 8.2.1 Supply And Lay Concrete Pipe Culverts**

Delete the title of the Sub-Clause and substitute with:

#### **SUPPLY, LAY, JOINT, BED AND TEST PIPELINES**

Add to Sub-Clause:

The bedding shall be Class C, unless otherwise specified or shown on the drawings.

Add to the Sub-Clause:

The rates shall cover the cost of providing the pipes as well as the cost of laying, bedding, jointing and making connections into manholes and testing the pipeline.

#### **PSLE 8.2.4 Extra Over Items 8.2.1 And 8.2.2 For Cutting End Units For Culverts On Site**

Delete this Sub-Clause as no extra payment will be made for cutting end units for culverts.

**PSLE 8.2.8 Supply And Install Manholes, Catch Pits And The Like**

Delete the words “but excluding excavation and backfilling, which will be measured separately” and replace with “and including dealing with any excavation (in all materials including disposal of surplus) that is additional to that measured under the item for pipe trench excavation, backfilling and compacting. The rate shall also cover the cost of all reinforcing, formwork, epoxy coating of cast iron fittings and the requirements complying with the safety and protection requirements of Sub-clause 5.1 of SABS 1200 DB”

**PSLE 8.2.14 Subsoil Drains (New Sub-Clause)**

Add new Sub-Clause:

The tendered rate shall cover the cost of acquiring, regardless of distance, the required material from commercial sources, delivering it to points alongside the trench spaced to suit the Contractor's method of working, plant and labour and the disposal of material displaced by such importation at the designated spoil site.

Excavation for subsoil drains shall be measured as per SANS 1200DB.

**PSLE 8.2.15 Minor Drainage Structures (New Sub-Clause)**

Add new Sub-Clause:

Catch pits, manholes, drop inlets and headwalls will be measured and paid for as complete units.

The unit of measurement shall be the number of the particular type, size and category of drainage units supplied, constructed and installed in accordance with the drawings.

The tendered rate shall include for all materials, plant, labour, supervision and incidentals for the construction of the drainage units complete and in accordance with the drawings.

The tendered rate shall further include for all necessary excavation in all materials, backfilling and disposal of surplus materials, formwork, concrete, benching, concrete finish, reinforcement, precast elements, steel channels and grids, step irons and all other items not specifically measured elsewhere necessary for completion of the unit in accordance with the drawings.

The tendered rate shall include for all costs involved in complying with the requirements of the relevant specifications in respect of the individual types of work involved in completion of the units.

The tendered rates shall exclude for excavation in intermediate and hard material, payment for which shall be made as an extra over in the Schedule of Quantities.

Supply, construct and install drainage unit of the type, size category and depth stated in the Bill of Quantities

Unit: No

**PSLE 8.2.16 Outlet Headwalls (New Sub-Clause)**

Add new Sub-Clause:

The tendered rate shall cover the cost of all materials, plant, labour, additional excavation and disposal required to construct the headwall complete as per the detail provided for DN375, DN450, DN600, DN900 and DN1500 pipes.

**PSLE 8.2.17 Break Into Existing Manhole, Drop Inlet Or Catch Pit And Install New Pipe (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be the Number (No.)

- i) 375mm diameter pipe
- ii) 450mm diameter pipe
- iii) 600mm diameter pipe
- iv) 900mm diameter pipe

The rate shall include all labour, plant and materials necessary to break into the existing stormwater structures and to install new pipes and repair the benching. The rate shall include for disposing of rubble and excess material, regardless of distance.

**PSLE 8.2.18 Supply, Lay And Bed Slotted Subsoil Pipes 110mm Diam In HDPE (Drainex Or Similar Approved) (New Sub-Clause)**

Add new Sub-Clause:

Unit: m

The rate shall include for supplying, jointing, laying and bedding pipes, lubricants, joints, cutting, trimming and waste. No deductions will be made for specials, junctions, etc. Slotted pipes shall be HDPE pipes to comply with SANS 4427 Part II.

**PSLE 8.2.19 Extra Over Clause PSLE 8.2.18 For Pipe Junctions**

Add new Sub-Clause:

The rate shall include for supplying, jointing and laying all junctions, cutting, trimming and waste, joints and lubricants. Junctions will be made with standard uPVC soil or HDPE and drainage fittings

Unit: No

**PSLE 8.2.20 Extra Over Clause 8.2.18 For Capping Pipe Ends With Geofabric (U24 Or Similar) (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to cap pipe end with two layers of geofabric securely tied to the pipe 100mm from the end with binding wire

Unit: No

**PSLE 8.2.21 Extra Over Clause 8.2.18 For Building Pipes Into Manhole (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to build subsoil pipes into concrete or brick manholes

Unit: No.

**PSLB 8.2.22 Extra Over Clause 8.2.18 For Rodding Eyes (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to construct the rodding eye complete as shown on the project drawings

Unit: No.

**PSLE 8.2.23 Protective Concrete (Grade 20/19 Cover Slabs Complete (1000mm Wide By 150mm Thick) (New Sub-Clause)**

Add new Sub-Clause:

The unit of measure shall be the cubic meter of concrete provided according to the authorised dimensions of the protective concrete cover slabs. The rate shall include preparing the surface, providing and placing a plastic membrane over the granular surface, excavation into the side of the trench (if required), formwork, providing and casting the concrete in 2m long panels and finishing the concrete surface by means of a wood float finish. All plant labour and material costs to construct the protective cover slabs complete, shall be included in the tendered rate

Unit: No

**PSM           ROADS – (GENERAL) (SABS 1200 M – 1981)****PSM 2           INTERPRETATIONS****PSM 2.2       DEFINITIONS**

A lot shall be one day's work.

**PSM 2.2.30   Add to:**

A lot shall be one day's work.

**PSM 2.2.55   Add to:**

Top Soil : the top layer of soil containing a proportion of decomposed organic material nominally 150 mm thickness

**PSM 7         TESTING****PSM 7.3       ROUTINE INSPECTION AND TESTING**

Delete Sub-Clause and replace with:

The compliance of earthworks and layerworks with respect to layer density shall be determined in accordance with Appendix 8 - Statistical Judgement Plan.

**PSM 7.4       COMPACTION CONTROL**

Add to Sub-Clause:

Refer to Clause PSA 7.3 : Methods of Test

**PSME SUBBASE (SABS 1200 ME – 1981)****PSME 3 MATERIALS****PSME 3.1 CLASSIFICATION FOR EXCAVATLON PURPOSES****PSME 3.1.3 For the rehabilitation of the existing pavement (New sub-clause)**

Add new Sub-Clause:

Subbase	C3 comprising pulverized asphalt insitu recycled with underlying insitu subbase material, stabilized and processed as a single composite layer.
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**PSME 3.1.4 For the rehabilitation of the existing pavement (New sub-clause)**

Subbase	C4 comprising pulverized asphalt insitu recycled with underlying insitu subbase material, stabilized and processed as a single composite layer.
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**PSME 3.2 PHYSICAL PROPERTIES****PSME 3.2.1 Subbase Material**

Add the following:

Materials with properties at variance to the specified requirements may be used in the subbase at the discretion of the Engineer.

d) Region factor 0,75

**PSME 3.2.2 Gravel Shoulder and Gravel Wearing Course Material**

Materials with properties at variance to the specified requirements may be used in the Subbase at the discretion of the Engineer.

**PSME 5 CONSTRUCTION****PSME 5.4 PLACING AND COMPACTION****PSME 5.4.4 Compaction****PSME 5.4.4.2**

in line 4 amend 93% to 95%.

**PSME 5.5.8 Rehabilitation of existing pavement (C3) (New sub-clause)**

Add new Sub-Clause:

The existing asphalt surfacing shall be processed to construct a new C3 stabilised subbase layer for the full road width over the required area. This rehabilitation process of the existing pavement is described hereunder:

Using appropriate equipment (e.g. milling machine), the existing asphalt shall be pre-pulverized to a depth of 100 mm producing a uniform granular layer. After pre-shaping, the cement stabilizing agent shall be spread at a pre-determined rate of application over the surface to be treated. Appropriate recycling plant (e.g. milling machine) shall be used to insitu stabilize the pre-pulverised asphalt together with the underlying insitu subbase materials in a single pass.

#### **PSME 5.5.9 Rehabilitation of existing pavement (C4) (New sub-clause)**

Add new Sub-Clause:

The existing asphalt surfacing shall be processed to construct a new C4 stabilised subbase layer for the full road width over the required are. This rehabilitation process of the existing pavement is described hereunder:

Using appropriate equipment (e.g. milling machine), the existing asphalt shall be pre-pulverised to a depth of 100 mm producing a uniform granular layer. After pre-shaping, the cement stabilizing agent shall be spread at a pre-determined rate of application over the surface to be treated. Appropriate recycling plant (e.g. milling machine) shall be used to insitu stabilize the pre-pulverised asphalt together with the underlying insitu subbase materials in a single pass.

#### **PSME 5.7 TRANSPORT**

Delete Sub Clause PSME 5.7.1 and PSME 5.7.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

#### **PSME 8 MEASUREMENT AND PAYMENT**

##### **PSME 8.3.11 Insitu reconstruction of existing pavement layers: pre-pulverising (New sub-clause)**

Add new Sub-Clause:

Stabilization of the existing asphalt and insitu subbase material to the specified depth:

(i) 95% of modified AASHTO density (C3) Subbase layer

Unit: m<sup>3</sup>

The unit of measurement shall be the cubic metre of compacted stabilized pavement layer comprising pulverized asphalt and subbase stabilized insitu, the quantity of which shall be calculated from the authorized dimensions of completed layer as shown on the drawings or as directed by the Engineer.

The tendered rate shall include full compensation for the pre-pulverising of the existing asphalt to the specified depth.

The tendered rate shall also include full compensation for spreading the stabilizing agent, mixing by insitu recycling of the pavement layer comprising the blended materials to the specified depth in a single pass, compacting the material as well as the protection and maintenance of the layer and conducting control tests.

The tendered rate shall also include full compensation for curing the stabilized layer and any water, materials, supervision, plant, labour, equipment, tools and incidentals



necessary for constructing the specified work. The tendered rate excludes the cost of supplying the stabilizing agent.

**PSME 8.3.12 Insitu reconstruction of existing pavement layers: pre pulverising (New sub-clause)**

Add new Sub-Clause:

The stabilization of the existing asphalt and insitu subbase material to the specified depth:

(i) 95% of modified AASHTO density (C4) Subbase layer

Unit: m<sup>3</sup>

The unit of measurement shall be the cubic metre of compacted stabilized pavement layer comprising pulverized asphalt and subbase stabilized insitu, the quantity of which shall be calculated from the authorized dimensions of completed layer as shown on the drawings or as directed by the Engineer.

The tendered rate shall include full compensation for the pre-pulverising of the existing asphalt to the specified depth.

The tendered rate shall also include full compensation for spreading the stabilizing agent, mixing by insitu recycling of the pavement layer comprising the blended materials to the specified depth in a single pass, compacting the material as well as the protection and maintenance of the layer and conducting control tests.

The tendered rate shall also include full compensation for curing the stabilized layer and any water, materials, supervision, plant, labour, equipment, tools and incidentals necessary for constructing the specified work. The tendered rate excludes the cost of supplying the stabilizing agent.

**PSME 8.3.13 Construct 250mm dump rock layer from crushed stone obtained from commercial sources (New sub-clause)**

Add new Sub-Clause:

Dump Rock 75mm max. size. blinded with crusher dust

Unit: m<sup>3</sup>

The tendered rate shall include full compensation for procuring, furnishing and placing all materials and for providing the completed dump rock subbase layer as specified. The rate shall also include for hauling the material from the commercial source to its final position of the road".

**PSMF BASE (SABS 1200 MF – 1981)****PSMF 1 SCOPE****PSMF 1.1**

Add to Sub-Clause:

This section covers the construction of a 150mm G2 graded crushed stone base layer for the roads.

**PSMF 3 MATERIALS****PSMF 3.3 PHYSICAL AND CHEMICAL PROPERTIES****PSMF 3.3.1 Natural Gravel (Stabilised or Unstabilised)**

Materials with properties at variance to the specified requirements may be used in the base at the discretion of the Engineer. The following table will apply for a gravel wearing course.

REQUIREMENTS FOR GRAVEL WEARING COURSE		
PARAMETER	LIMIT	
	TYPE 1	TYPE 2
Maximum size, mm	37,5	37,5
Oversize Index ( $I_o$ ) (maximum), %	$\leq 5$	0
Shrinkage Product ( $S_p$ )	100 - 365 (maximum of 240 preferable)	100 - 240
Grading coefficient ( $G_c$ )	16 - 34	16 - 34
CBR at $\geq 95\%$ modified AASHTO Compaction (soaked value) (minimum), %	$\geq 15$	$\geq 15$
$I_o$ = Oversize Index (percent retained on 37.5mm sieve)		
$S_p$ = Linear shrinkage x (percent passing 0.425mm sieve)		
$G_c$ = (Percent passing 26.5mm - percent passing 2.0mm) x percent passing 4.75mm/100		

**PSMF 3.3.2 Graded Crushed Stone**

Delete "SANS 1083" and replace with "SABS 1200M : 1996 Roads (general)."

Delete Sub-Clause (a) and replace with:

The maximum stone size for the G2 base shall be 37.5mm."

**PSMF 5.4 PLACING AND COMPACTION****PSMF 5.4.1 Placing**

Amend this sub-clause to read:

Before construction of the base is commenced, the Contractor shall ensure that the underlying layer on which the base is to be constructed and the kerbing and channelling

have been completed, comply with the requirements of the Specifications covering the underlying layer and kerbing and channelling and have been approved by the Engineer. All cost in situ mountable kerbing, channelling, vehicle entrances, transitions, etc, shall have been laid for a period of at least 72 hours before construction of the base course is commenced.

**PSMF 5.4.4.1**

Delete Sub-Clause and replace with:

Compaction shall be carried out at the appropriate moisture content (this may be in excess of the O.M. C.) for the type of material used and compaction equipment employed to achieve the required minimum density.

**PSMF 5.4.4.2**

Delete Sub-Clause and replace with:

The G2 base for the roads shall be compacted throughout to a lower Specification limit (LS) Value of 86% of Bulk Relative Density.

**PSMF 5.9      TRANSPORT**

Delete Sub Clause PSMF 5.9.1 and PSMF 5.9.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

**PSMF 7      TESTING****PSMF 7.3      ROUTINE INSPECTION AND TESTING**

Add to Sub-Clause:

All measurements and test results shall be assessed in accordance with Clause 7.3.3, of SABS 1200M : 1996 Roads (General), Appendix B : Statistical Judgement Plan.

The lower specification limit (Ls) applicable to the relative compaction of the G2 base layer for the roads in Table B.5 of SABS 1200M: 1996 shall be 100% MAASHTO density

**PSMH ASPHALT, BASE AND SURFACING (SABS 1200 MH)****PSMH 1 SCOPE**

Add to Sub-Clause:

This section also covers the supplying and furnishing of materials for the construction of a bituminous double seal. The seal shall be constructed using either 19,0 mm plus 9,5 mm aggregate, of the specified grade.

**PSMH 3 MATERIALS****PSMH 3.2 CURING COAT**

Add to Sub-Clause:

A curing coat will not be required.

**PSMH 3.3 TACK COAT**

Add to Sub-Clause:

A tack coat is required on all joints and under all asphalt layers, where instructed by the Engineer.

The tack coat shall consist of a 30% stable grade emulsion conforming to SANS 309 (Anionic) or SANS 548 (Cationic)."

**PSMH 3.4 BITUMINOUS BINDER****PSMH 3.4.2 Surfacing**

Add to Sub-Clause:

The grade of bituminous binder shall be a 60/70 pen. grade bitumen complying with the requirements of SANS 307.

**PSMH 3.5 AGGREGATES****PSMH 3.5.1 General**

Add to Sub-Clause:

The aggregates shall meet Grade 1 requirements"

**PSMH 3.5.2 Type**

Add to Sub-Clause:

A maximum of 15% natural sand shall be allowed in the combined aggregate for the asphalt surfacing mix.

**PSMH 3.5.4 Bituminous binder absorption**

Delete "1.0%" and replace with "0.5% ".

**PSMH 3.5.5 Sand equivalent**

Delete Sub-Clause and replace with:

The minimum sand equivalent value of the blended aggregate shall be 45.

### PSMH 3.5.6 Grading

Add to Sub-Clause:

The combined aggregate grading for the continuously graded medium surfacing working mix shall be:

**TABLE 2: GRADING FOR COMBINED AGGREGATE FOR SURFACING**

SIEVE SIZE (mm)	CONTINUOUSLY GRADED (MEDIUM)
13,2	100
9,5	82-100
4,75	54-75
2,36	40-57
1,18	27-42
0,6	18-32
0,3	12-23
0,15	7-16
0,075	4-10

The use of run of crusher materials will not be permitted for the production of the mixture. The coarse aggregate shall be accurately proportion from single size aggregate fractions. The Engineer may request a reconsideration of blends to achieve any grading in the given envelope.

The nominal mix proportions by mass shall be as follows:

Aggregate: 93%

Bitumen: 6%

Active filler: 1%

The percentage by mass of the material less than 0,005mm as determined by test method A6 of TMH1, shall be less than 1,0% of the combined aggregates, excluding the active filler."

Add the following:

The flakiness of the coarse aggregate when determined in accordance with TMH 1 Method E13, shall not exceed 25 for the following separate sifted-out fractions of the combined aggregate:

- (i) fraction passing through the 19,0mm sieve and retained on the 13,2mm sieve;
- (ii) fraction passing through the 13,2mm sieve and retained on the 9,5mm sieve; and
- (iii) fraction passing through the 9,5mm sieve and retained on the 6,7mm sieve."

**PSMH 3.5.7 Resistance to crushing (New sub-clause)**

Add the following:

The aggregate crushing value (ACV) of the coarse aggregate when determined in accordance with TMH 1 method B1, shall not exceed 25."

**PSMK 3.6 MINERAL FILLER****PSMH 8.6.1 Base and continuously graded gap graded surfacing**

Add to Sub-Clause:

For tender purposes, the active filler shall be hydrated calcitic lime.

**PSMH 5 CONSTRUCTION****PSMH 5.1 GENERAL REQUIREMENTS****PSMH 5.1.1(a) For priming**

Add to Sub-Clause:

The prime coat shall not be applied unless the moisture content over the entire depth of the G2 crushed stone base layer is less than 50% of the optimum moisture content.

**PSMH 5.1.1(b) For asphaltting**

Delete the first sentence of Sub-Clause (b) and replace with:

Immediately before a tack coat is applied, the primed surface of the base or of the existing wearing course shall be broomed and cleaned of all loose deleterious material.  
The tack coat shall be allowed to dry properly before the asphalt is placed.

**PSMH 5.8 COMPACTION**

Add to Sub-Clause:

The compacted asphalt for the roads shall have a lower specification limit (Ls) for density of at least 95% of the Bulk Relative Density, determined in accordance with TMH1 method C3, on cores from the constructed layer.

The compacted asphalt shall also comply with the specified requirements for surface texture.

**PSMH 5.9 JOINTS**

Add to Sub-Clause:

Whenever the paver stops for more than 30 minutes and/or the material cools down to below rolling temperature (normally 120°C), joints shall be constructed as specified in Sub-Clause 5.9.

Joints shall be cut between existing and new surfacing and shall be a neat straight line parallel to (for longitudinal joints) or at 20° skew (for transverse joints) to the general alignment of the road. All joints shall be saw cut using an approved asphalt saw cutting device.

All joint faces shall be tacked in accordance with Clause 5.1.

## **PSMH 8 MEASUREMENT AND PAYMENT**

### **PSMH 8.5.4 Asphalt**

Change the unit of measurement from:

Unit: "t" to Unit: "m<sup>2</sup>"

Add to Sub-Clause:

The unit of measurement shall be the square metre and the quantity shall be calculated as the nett area of roadway surfaced in accordance with the drawings.

### **PSMH 8.6 REINSTATEMENT OF ALL SURFACES (NEW SUB-CLAUSE)**

New to Sub-Clause:

Each Tenderer shall include in his tender allowances to cover the costs of reinstating all surfaces and inclusive of all layers to their conditions pertaining before the commencement of construction.

Items have been included in the Bill of Quantities to cover the reinstatement of certain surfaces (grassed lawns, concrete and/or asphalted/gravel driveways and/or roads) and for payment purposes, the area of those specific surfaces shall be calculated from the product of the length of the trench and the specified trench width plus 400 mm (refer PSDB 5.4).

The Contractor is to include in his tender for the reinstatement of all surfaces to the original condition prevailing before the commencement of construction.

In addition, where driveways are to be regraded as a result of the road realignments, the area of those specific surfaces shall be calculated from the product of the length and the width of the section of the driveway that has been regraded.

The reinstatement of all the abovementioned surfaces shall be inclusive of kerbing.

Reinstate bitumen driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate paved (brick) driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate paved (cobbles) driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate concrete driveways and footways and kerb	Unit: m <sup>2</sup>

**PSMK KERBING AND CHANNELING (SABS 1200MK)****PSMK 8 MEASUREMENT AND PAYMENT****PSMK 8.2 SCHEDULED ITEMS****PSMK 8.2.2 Concrete Kerbing And Channeling Combined**

Add to Sub-Clause:

Only the standard details shown on drawings will be paid for per metre. The rate tendered shall include for all excavation, surface preparation, formwork, materials (including mesh where shown) and finishing to construct the complete kerbs/channels as detailed.

In all other areas where a non-standard profile is to be constructed (as instructed by the Engineer) excavation shall be measured separately. Concrete shall be measured per cubic metre of concrete placed to the neat dimensions as instructed by the Engineer. (Nominal depth will vary between 100mm and 200mm.) The rate tendered for concrete in open drains and channels shall include for preparing the surface to receive concrete, the concrete itself and any floating required to achieve the specified surface finish. Mesh reinforcement, where required, will be measured separately.

**PSMM ANCILLARY ROAD WORKS (SABS 1200MM)****PSMK 2.1 SUPPORTING SPECIFICATIONS**

Add to Sub-Clause:

The South African Road Traffic Signs Manual (1993) forms part of this specification as well as the attached Transportation Management Plan.

**PSMM 3 MATERIALS****PSMM 3.1 GUARDRAILS, POSTS AND REFLECTOR PLATES****PSMM 3.1.1 Guardrails**

Add to Sub-Clause:

Guardrails and end wings shall be galvanised with a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type A 1 articles.

All bolts, nuts and washers shall have a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type C1 articles.

**PSMM 3.1.2.1 Timber**

Add to Sub-Clause:

Timber for use in guardrail posts and spacer blocks shall be treated hardwood.



**PSMM 3.2 ROAD SIGNS****PSMM 3.2.1 General**

Add to Sub-Clause:

Road signs are not detailed on the drawings. They shall, however, conform to the requirements of the latest South African Road Traffic Signs Manual.  
The supports do not require breakaway devices

**PSMM 3.2.9 Retro-reflective material**

Add to Sub-Clause:

The background for the signs shall be reflectorised and the material shall be of engineering grade complying with the requirements of CKS 191.

**PSMM 5 CONSTRUCTION****PSMM 5.2 ROAD SIGNS****PSMM 5.2.1 Manufacture of supports and backing plates****PSMM 5.2.1.1 Supports**

Add to Sub-Clause:

The supports shall be 60mm nominal diameter galvanised tubing to SANS 657 with a nominal wall thickness of 2,0mm.

Each support shall be drilled as necessary to support the relevant sign and shall have a 12mm mild steel rod, 200mm long, welded in position in a hole drilled at right angles to the axis of the tube, at 85mm from the lower end, so as to project equally on either side of the tube and prevent the tube from being rotated when erected.

All structural members used shall be treated to resist corrosion by hot dipped galvanising and by painting with one coat of calcium plumbate primer and two coats of grey enamel. All structural members used with aluminium sign faces shall be properly insulated against galvanic action by painting the contact surfaces with an approved bitumastic paint and shall be bolted together with 12,7mm (1/2") diameter cadmium plated bolts.

**PSMM 5.2.1.2 Backing plates and boards**

Add to Sub-Clause:

Statutory signs shall be constructed from 2,0mm thick aluminium alloy flat sheet to BS EN 485-2:2008 hardened to 3/4 :H. The signs shall have suitable mounting brackets to facilitate mounting to the supports. Stainless steel mounting bolts are preferred and should be insulated from the aluminium by suitable plastic washers.

**PSMM 5.2.4 Erection of road signs**

Add to Sub-Clause:

Road signs shall be erected so that the lower edge of the sign is a minimum of 2,10m above final ground level.

**PSMM 5.3.6 Road studs**

Add to Sub-Clause:

Roadstuds shall be extruded aluminium "Lynkor Lynx" with a 43 element reflector fitted with a M10 x

35mm anchor shank for use on asphalt surfacings.

All roadstuds are to be installed by the manufacturer or an approved and registered sub-contractor or the manufacturer.

**SMM 5.5 ACCOMMODATION OF TRAFFIC (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Subject to the provision contained in SABS 1200 MM: 1984, the tendered rates shall include for the following:

**PSMM 5.5.1 Scope (New sub-clause)**

Add new Sub-Clause:

This section covers the construction and maintenance of the necessary temporary deviations and detours, barricades and signs, and everything necessary for the safe and easy passage of all public traffic during the construction and maintenance periods, and also the obliteration of temporary deviations as they become redundant. The section also covers the accommodation of traffic on existing roads without the deviation of traffic onto temporary deviations.

**PSMM 5.5.2 General requirements (New sub-clause)**

Add new Sub-Clause:

**(a) Safety**

The Contractor shall be responsible for the safe and easy passage of public traffic past and/or over sections of roads of which he has occupation. Traffic accommodation and temporary construction signing is the sole responsibility of the Contractor. The Contractor shall at all times in all his operations and in using his construction plant, take the necessary care to protect the public and to facilitate the flow of traffic. The Contractor may not commence with any part of the works before he has made adequate provision for the accommodation of traffic.

If work has to be done under traffic, the Contractor shall see to it that his employees are clearly visible. In order to ensure that the traffic accommodation strategies are performing as intended, the Contractor shall monitor and maintain traffic accommodation at the work zone on a regular basis.

The Contractor shall monitor all traffic control devices, temporary signing and roadway conditions during periods of inactivity. The frequency of inspection shall be commensurate with the traffic volumes in the sector and under no circumstances shall consecutive inspections be more than six hours apart, unless otherwise agreed by the Engineer. All site inspections shall be documented by the Contractor and made available for the Engineers review upon request. The traffic accommodation measures will be monitored by the Engineer and if, in the opinion of the Engineer, traffic is being unduly hindered, the Contractor may be required to modify his traffic accommodation measures.

In cases where the Contractor is not in compliance with the specifications and, in the opinion of the Engineer, there is imminent danger to the travelling public, the Engineer has the authority to order the immediate suspension of Work until the required improvements to the situation have been made.

In other cases, where the Contractor is not in compliance with the specifications but, in the opinion of the Engineer, the infraction is not causing imminent danger to the travelling public, the Engineer will use the following escalating process to address the situation:

- (i) Issue verbal instructions requiring the Contractor to correct the infraction
- (ii) Issue a written warning instructing the Contractor to correct the infraction
- (iii) Issue a written order instructing the Contractor to suspend Work until the infraction is corrected to the satisfaction of the Engineer.

**(b) Providing temporary deviations**

Except where the existing road is to remain in use for through traffic, the Contractor shall provide, construct or put in order such temporary deviations as may be required for deviating traffic from such sections of the road as are handed over to him.

Should the Contractor prefer to build temporary deviations at his own initiative in stead of complying with the requirements of the specifications, he shall obtain the Engineer's prior written approval. If the Engineer's prior written approval has been obtained, the Contractor will be remunerated for the accommodation of traffic up to an amount that does not exceed the tendered amount for the accommodation of traffic in accordance with the specifications.

**(c) Minimum vertical clearance**

The minimum vertical clearance over any section of a temporary deviation shall be 5,2m. If the minimum clearance available is less than 5,2m, the minimum clearance shall be indicated on approved signs at approved locations on and in advance of the obstruction.

**(d) Property and survey beacons**

Where possible, temporary deviations shall be constructed so as not to damage or displace property or trigonometrical-survey beacons. In exceptional cases where this is not possible, the Contractor shall notify the Engineer in good time so that he may arrange to have them suitably referenced before they are displaced.

**(e) Access to properties**

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area over which he is working. No separate payment will be made for the provision and maintenance of such accesses and facilities, except for access ramps as specified in PSMM 5.5.18.

**f) Approval of temporary deviations**

The need for and details concerning all temporary deviations shall be approved by the Engineer before the construction of such temporary deviations commences, and the Contractor shall satisfy himself before tendering that he can make arrangements in respect of any temporary deviations as may be necessary for the safe and convenient passage of traffic.

**g) Temporary works**

The temporary deviations provided by the Contractor shall include the construction of temporary gates, fences, drainage works, and other incidentals considered by the Engineer to be necessary.

**h) Public services**

Public services affected by temporary deviations shall be treated in a similar manner as services affected by the permanent works and payment shall be made in accordance with the provisions of SABS 1200A Clause 8.8.4.

**i) Traffic Safety Officer**

The safety of the traveling public is of utmost importance and every effort must be made to ensure that all road signs, barricades, delineators, flagmen and speed controls are maintained and are effective and that courtesy is extended to the public at all times.

The Contractor shall appoint a competent person on site who shall be the responsible person for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract.

This person shall be referred to as the Traffic Safety Officer, shall have representatives in each sector and shall liaise daily with the Engineer in order to maintain proper traffic arrangements at all work fronts. The Traffic Safety Officer shall be qualified, trained and experienced in traffic control and must be knowledgeable in the operation of the traffic control devices and other related equipment.

The Traffic Safety Officer shall be required to perform the following duties and this list shall not be deemed to be comprehensive. He/she shall:

- (i) be responsible for keeping the temporary traffic accommodation requirements up to specification 24hours a day 7 day a week
- (ii) compile and maintain a complete daily record of traffic signs installed and the traffic signs sequence at each location during the execution of the contract
- (iii) inspect and report to the Engineer on the state of all required road signs as often as the Engineer may require but in any event not less than once every six hours or at such other intervals as may be specified
- (iv) exercise control in terms of traffic safety over the safe movement of personnel, visitors and plant on site including the wearing of high visibility clothing, the operation of amber flicker lights, and the display and cleanliness of "construction vehicle" signs, all as specified
- (v) exercise responsibility for keeping road signs and traffic cones clean and visible at all times. The Contractor shall remove all bituminous and other foreign matter from road signs and traffic cones or provide new road signs and traffic cones, all at the Contractor's own cost, and all as directed by and to the approval of the Engineer
- (vi) compile complete records of traffic accident scenes which are in any way connected with construction activities, and draw up accident reports (including photographs)
- (vii) attend to the training and performance of flagmen and all other personnel involved in the control of traffic
- (viii) attend to all complaints and claims from the public with regard to traffic safety and report on such matters to the Engineer.
- (ix) Liaise with the Publicity Company staff, appointed by the Employer, in order to ensure that communications effort of the Employer is supported at all times in terms of the guidelines for communication as established during the execution of the Contract.

The Traffic Safety Officer and his representatives shall be provided with suitable transport in order to execute their duties

**PSMM 5.5.3 Temporary traffic control facilities (New sub-clause)**

Add new Sub-Clause:

The Contractor shall provide, erect and maintain the necessary traffic control devices, road signs, channelization devices, barricades, warning devices, temporary signals and road markings (hereinafter referred to as traffic control facilities), as shown on the drawings and in the Transportation Management Plan, move these traffic control facilities from location to location as required and shall remove them when no longer required. It shall be incumbent upon the Contractor to see to it that the above-mentioned traffic control facilities are present at all time and are functioning properly, but, prior to any section of the road which requires the above facilities being opened to traffic, the Contractor shall submit his proposals in this regard to the Engineer for his information and approval.

The Contractor shall immediately, at any time of the day or night, on a 7 day a week basis, make good any shortcomings to the temporary traffic control facilities, should it become necessary. ( See requirements for 24 hour response teams )

The proceedings, claims, actions, damages and costs which may arise from or be related to the absence or improper functioning or placement of traffic control facilities shall be the responsibility of the Contractor. Traffic control facilities no longer required may be moved for re-use, and, if no longer suitable for use, shall be replaced without any additional compensation if they are required for re-use.

The type of construction, spacing and placement of traffic control facilities shall be in accordance with the prescriptions and recommendations of the latest edition of the South African Traffic Signs manual, the Transportation Management Plan and in accordance with the instructions and drawings of the Engineer.

The tendered rates shall be deemed to include for the supply, erection, maintenance, operation and relocation of the said traffic control facilities. It shall also include for the replacement of same as and when required.

The various traffic-control facilities which may be required are the following:

**(a) Traffic-control devices**

Traffic-control devices include the use of flagmen, portable STOP and GO-RY signs, and traffic signals, whichever may be required. Traffic signals shall be erected only if so specified in the project specifications or upon an instruction in writing, by the Engineer.

If the road is partially closed and one-way traffic only is allowed over a section of road of which the length exceeds 250m, the traffic shall be regulated by flagmen and STOP and GO-RY signs at both ends of such section. It is necessary for effective communication between the flagmen. An approved two-way communication system shall be in operation at the control points.

Temporary traffic control facilities, if applicable, shall be provided with portable stands adequately ballasted with sandbags to prevent the signs from being blown over by wind or wind turbulence from moving traffic, whenever they are used in a situation where the temporary signs must be relocated frequently.

**(b) Road signs and barricades**

Road signs shall include all the statutorily required road signs in the permanent or temporary series, which shall also include delineators and moveable barricades (the barricade, sign combination type), or an appropriate combination thereof.

**(c) Channelization devices and barricades**

Channelization devices shall include delineators, cones, barricades, guardrails, barriers, road studs or road markings, or any appropriate combination of these devices.

**(d) Road Barriers**

Road Barriers for preventing vehicles from leaving the permitted lanes may consist of movable barriers (for example the New Jersey type or similar approved ) of approved construction for separating two opposite traffic streams, or ordinary guardrails.

Should road barriers as specified under PSD, be utilized as part of the layout required for managing traffic in terms of figure 2 to 7 (Transportation Management Plan) additional payment for such barriers will not be applicable as the tendered rates for accommodation of traffic shall be deemed to include for the use of such barriers.

**(e) Warning devices**

All construction vehicles and plant used on the works shall be equipped with rotating amber flashing lights. All lights shall be visible at all times and from all sides. The flashing lights shall be switched on at all times when the vehicles and plant are used on the site for the execution of the works.

Warning boards shall be mounted on construction vehicles and plant and shall be clearly visible. The words CONSTRUCTION VEHICLE shall be displayed on these boards in 250mm high red letter on a white background.

No separate payment will be made for the supply of flashing lights and warning boards and the installation thereof on construction vehicles and plant.

**(f) Road Markings**

Road markings may be required on bituminous and concrete surfaces and will include road-marking studs wherever necessary. Any painted road markings which no longer apply shall be removed. Road-marking studs shall be removed completely.

**PSMM 5.5.4 Width and length of temporary deviations (New sub-clause)**

Add new Sub-Clause:

The roadway width of gravel temporary deviations accommodating two-way traffic shall be not less than 10m. Where temporary deviations consist of two separate one-way lanes, the minimum usable width of each lane shall be not less than 5m.

In the case of a two-lane temporary deviation the total width of the carriageway shall be 8.5m and, if a bituminous surface is provided, it shall comprise two lanes of 3.5m width each and centrally located on the roadway. A single lane temporary deviation shall have a 5.0m wide carriageway and, if required, a centrally located 3.5m wide surfaced lane.

Because of the limitation on overtaking in the case of single lane temporary deviations, such deviations shall be as short as possible with a maximum length of 1.0km.

If wider temporary deviations are required, such widths shall be specified in the project specifications and/or on the drawings.

**PSMM 5.5.5 Temporary drainage works (New sub-clause)**

Add new Sub-Clause:

All stormwater installations shall be measured under the relevant items in the Bill of Quantities for permanent work.

The Contractor shall adhere to the requirements of the Environmental Management Plan, Stormwater Management Plan which he has to draw up for the construction period and dealing with water in terms of the specifications.

**PSMM 5.5.6 Earthworks for temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

The Contractor shall shape and grade the temporary deviations and shall make full use of all material that can be obtained from alongside the temporary deviations, from side cuts or from the immediate vicinity. If an adequate quantity of material cannot be obtained in

this manner, he shall import material from other sources. Where necessary, cuttings shall be made to obtain a satisfactory vertical alignment. The Contractor shall also perform the necessary clearing and grubbing, including the removal of all trees and stumps. Where the subgrade is not sufficiently dense in its natural state, it shall be scarified to a depth of 200mm, mixed, watered, and compacted to 90% of modified AASHTO density.

Any fills which may be necessary for any reason, eg for the construction of fords, shall be constructed and compacted by the Contractor as described above. Wherever possible, fords shall be constructed from rockfill or coarse material so as to limit, in so far as is possible, damage caused by flood waters. The Contractor shall construct cuttings where required.

**PSMM 5.5.7 Gravelling of temporary deviations or of existing roads used as temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

When the earthworks for temporary deviations as described in Clause PSMM 5.5.6 have been completed, those sections of the temporary deviations, as indicated by the Engineer, shall be provided with a wearing course of suitable gravel approved by the Engineer.

The Contractor shall provide, spread, water, mix and compact such material to a density equal to 93% of modified AASHTO density.

If gravel shoulders are to be used for the accommodation of traffic and if the existing shoulders are unsafe for traffic, the shoulders shall be reconstructed as specified. All grass and couch grass shall be bladed from the surface. Approved gravel material shall be imported from the road reserve or from borrow pits. The materials shall be spread, watered, mixed and compacted to 93% of modified AASHTO density in layers of the specified thickness.

**PSMM 5.5.8 Selected gravel layers, crushed stone or asphalt base, stabilisation, and road marking as required for bitumen surfaced temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

Where specified in the project specifications or required by the Engineer, gravel layers of selected subgrade or subbase quality, crushed-stone base, asphalt base or stabilized gravel layers shall be constructed and road marking shall be done by the Contractor, all in accordance with the requirements of the relevant sections of these specifications and the Engineer's instructions.

**PSMM 5.5.9 Bitumen surfaced temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

Where required in the project specifications or by the Engineer, temporary deviations shall be provided with bituminous surfacing in accordance with the requirements of SABS 1200MH or of the project specifications, or as may be prescribed by the Engineer.

**PSMM 5.5.10 Existing roads used as temporary deviations (New sub-clause)**

Add new Sub-Clause:

Where existing roads are to be used as temporary deviations, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.



**PSMM 5.5.11 Existing roads used as haulage routes (New sub-clause)**

Add new Sub-Clause:

Where existing roads are to be used as haulage routes, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.

**PSMM 5.5.12 Maintenance of temporary gravel deviations and existing gravel roads used as temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

All gravel temporary deviations and existing gravel roads used as temporary deviations shall be maintained by the Contractor in a safe trafficable condition. Whenever required by the Engineer, the roads and temporary deviations shall be bladed by means of self-propelled road graders to provide a smooth riding surface free from corrugations. All potholes shall be repaired immediately.

The Engineer may also instruct the Contractor to water the temporary deviations to keep down dust or to facilitate the proper blading of the surface. All drainage works shall be maintained in a good working order.

The blading of surfaces of temporary deviations and the application of gravel and water shall be measured and paid for separately, but all other maintenance shall be deemed to be included in the rate tendered for Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations.

**PSMM 5.5.13 Maintenance of temporary deviations with bituminous surfacing and existing roads with bituminous surfacing used as temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

All roads with bituminous surfacing used by public traffic bypassing construction shall be maintained in a good and safe trafficable condition for the entire period during which such roads are used. Maintenance shall include the patching and repair of the bituminous surfacing, the clearing of shoulders, the clearing of all drains, including culvert inlet and outlet drains, and other incidentals and, unless otherwise specified in the project specifications, also the care and maintenance of all road markings, road signs, delineators and guardrails.

The cost of all maintenance to temporary deviations with bituminous surfacing shall be included in the rates tendered under Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations, except for the cost of repairs to the bituminous surfacing and pavement, which shall be paid for separately under item PSMM 5.5.9.

**PSMM 5.5.14 Accommodation of traffic where the road is constructed in half widths (New sub-clause)**

Add new Sub-Clause:

Where, by reason of difficult terrain or for any other reason, the construction of temporary deviations is unfeasible, the Contractor shall, upon the written instruction of the Engineer, construct the road in half widths to allow traffic to use that half of the road not under construction. The length of the half-width construction shall not exceed the length specified in the project specifications or on the drawings, or the length of the section of road that can



be constructed and completed in one day, whichever is the shortest. Provision shall be made for traffic travelling in opposite directions to pass at frequent intervals.

The Contractor shall arrange his work so as to allow traffic to have free one-way access to at least half the width of the roadway at all times during the construction period. He shall maintain that half of the road, which is being used for traffic for the time being, in a trafficable condition, to the satisfaction of the Engineer.

The length of work fronts on roads are to be limited in terms of Clause PS 5 of the Project Specification.

During the day the traffic shall be controlled by a STOP and RY/GO system.

Should the road be not in a safe trafficable condition for two-way traffic over the entire width at the end of each day's work, the Contractor shall provide adequate flagmen, signs, barricades, lights and the necessary staff at his own cost to ensure a reasonably free flow of traffic alternately in each direction throughout the entire period when the roadway is open to one-way traffic only.

#### **PSMM 5.5.15 Temporary fencing and gates (New sub-clause)**

Add new Sub-Clause:

Where ordered by the Engineer or specified on the drawings or in the project specifications, the Contractor shall make his own arrangements for providing either new fencing and gates or moving and subsequently reinstating existing fencing and gates.

#### **PSMM 5.5.16 The use of temporary deviations by the contractor (New sub-clause)**

Add new Sub-Clause:

The Contractor shall have the right to use public roads, including temporary deviations open to public traffic, but where his own traffic causes excessive damage or wear to such roads or constitutes a condition hazardous to public traffic, the Engineer shall have the right to regulate the Contractor's traffic over such temporary deviations and require the Contractor to provide, at his own cost, such maintenance, including wearing-course gravel and watering, as in the Engineer's opinion will be necessary in addition to that which would be required to maintain the temporary deviations properly when not used by the Contractor's construction traffic.

#### **PSMM 5.5.17 Obliteration of temporary deviations (New sub-clause)**

Add new Sub-Clause:

When traffic is routed permanently onto the new road, and on the written instructions of the Engineer, the Contractor shall obliterate the temporary deviations and designated sections of obsolete roads and road markings in accordance with section SABS 1200C

#### **PSMM 5.5.18 Access ramps (New sub-clause)**

Add new Sub-Clause:

Access Ramps for vehicles and pedestrians shall be placed across open excavated trenches, at all entrances to properties, where trench excavations obstruct access to these properties. Access Ramps shall be designed by a structural engineer to suit the circumstances of use which includes, but is not limited to: width of trench, loading requirements, stability of pipe trench or whichever design criteria are required or needs to be considered at any specific location.

Access Ramps shall be protected on each side by a stout two-rail timber fence, at least 1.2 m high, consisting of 150 mm x 75 mm timber verticals set firmly into the ground, with

75 mm x 50 mm rails securely fastened to them. At least 4 lamps and reflective markers must be provided at each crossing.

The load limitation of each ramp shall be clearly displayed and the Contractor shall ensure that this limit is in compliance with the required limit of the specific access. The Contractor shall take full responsibility for the adequacy of the Access Ramps.

Access Ramps shall be available at each and every work front for provision of access to properties.

Should access not be provided as a result of non availability of Access Ramps, excavation activities at the specific work front will be stopped until suitable Access Ramps are provided.

The tendered rates for the Access Ramps shall include for design, manufacture, placement, transportation, securing same to the ground, moving when required, provision of hand rails, lights and or any other aspect of the operation of the ramps that may be deemed required.

## **PSMM 8 MEASUREMENT AND PAYMENT**

### **PSMM 8.2 SCHEDULED ITEMS FOR GUARDRAILS**

### **PSMM 8.4 SCHEDULED ITEMS FOR ROAD MARKING**

Amend clause PSMM 8.4.1 title as follows:

#### **PSMM 8.4.1 Retro-reflectorised paint applied at a nominal rate of .42P/m<sup>2</sup>**

Amend the last paragraph of item 8.4.1 as follows:

The rate shall cover the cost of supplying all materials (including reflecting glass beads) and equipment necessary and for painting and protection (see 5.3.8), including the setting out of character, symbols and traffic islands marking and including the setting out and premarking of lines".

#### **PSMM 8.4.3 Road studs**

Add to Sub-Clause:

The type of road studs to be used shall be in terms of Clause PSMM 5.3.6.

### **PSMM 8.6 REMOVE EXISTING ROAD MARKINGS BY MEANS OF SAND BLASTING**

Add new Sub-Clause:

Unit: m<sup>2</sup>

The unit of measure shall be the square meter of actual road marking removed or obliterated by means of sandblasting.

The tendered rate shall include for all plant, labour, material, supervision and transportation costs, the necessary equipment, labour and materials, for any specific protection measures, accommodation of traffic and the clearing of the area of all dust, all as specified.

### **PSMM 8.7 ERECT TIMBER FENCING (POST AND RAIL) USING RECOVERED FENCING MATERIAL**

Add new Sub-Clause:

Unit: m

The unit of measure shall be the linear meter of timber fencing erected using recovered fencing material.

The rate shall include for the erection of timber fencing using recovered materials and includes all items and materials necessary to excavate holes, erect fencing, backfill postholes and dispose of surplus materials.

**PSMM 8.8 SUPPLY AND ERECT TIMBER FENCING (POST AND RAIL) COMPLETE**

Add New Sub-Clause:

Unit: m

The unit of measure shall be the linear metre of timber fencing (post and rail) erected.

The rate shall cover the cost of supplying and erecting the timber fencing (post and rail) excavating and backfilling post holes as well as disposing of the surplus materials.

**PSMM 8.9 ACCOMODATION OF TRAFFIC (NEW SUB-CLAUSE)**

Add new Sub-Clause:

**PSMM 8.9.1 Accommodating traffic and maintaining temporary deviations**

Add new Sub-Clause:

Unit: km

Unless otherwise stated, all costs including but not limited to the preparation and implementation of the Traffic Control Strategy, the supply and installation, maintenance and removal of all traffic control devices and temporary construction signing, the daily recording of temporary construction signing, the provision of flag persons, graveling, detour design, construction, dust abatement, maintenance, and removal, local road detour preparation, maintenance and restoration, dust abatement; and all labour, materials, equipment, tools, and incidentals necessary to complete the Work to the satisfaction of the Engineer will be considered incidental to the Work. The work shall be measured and paid for once only per kilometer for each type of traffic accommodation, in accordance with the TMP.

The tendered rate shall include full compensation for accommodating traffic and maintaining temporary deviations, including roads constructed in half-widths and existing roads used as temporary deviations during construction and maintenance periods, but excluding maintenance and repair work for which payment is specifically made under the other pay items provided. The tendered rate shall also include full compensation for the provision of communications equipment required for regulating the traffic, solving traffic problems and complying with the legal requirements of all authorities concerned.

The rate will be specified by type as per the Transportation Management Plan and the unit of measurement will be Kilometre for each type. The measurement will be rounded off to the nearest 0.1km at any given setup.

The tendered rate shall be fully inclusive of all material, equipment, personnel and legislative compliance cost necessary to accommodate any interference of traffic for the duration of the contract.

Temporary Traffic-Control Facilities:

a)	Flagmen	Unit : man-day
b)	Portable STOP and GO-RY signs.	Unit : No
c)	Amber flicker lights	Unit : No
d)	Road signs, R-and TR series (900mm)	Unit : No
e)	Road signs, TW series	
	(i) (1200mm sides)	Unit : No
	(ii) (1800 x 300mm)	Unit : No
	(iii) (2400 x 400mm)	Unit : No
f)	Movable barriers (plastic barriers).....	Unit : m
g)	Delineators (DTG50J) (800 x 200mm reflector size)	
	(i) Single	Unit: No.
	(ii) Mounted back to back	Unit: No.
h)	Traffic Cones (450)	Unit: No

The unit of measurement for (a) shall be a day worked by a flagman. The tendered rate shall include full compensation for a flagman who is required to control traffic by way of flags or portable STOP

and GO-RY signs and shall include the provision of flags and safety jackets.

The unit of measurement for (b), (c), (d), (e) and (g) shall be the number of each sign provided, and, as may be applicable, completely erected.

The tendered rates shall include full compensation for providing, and where applicable, erecting each sign complete. In the case of sub-item (b) it shall also include moving the sign as may be necessary.

The unit of measurement for (f) shall be the metre of each type of movable barriers provided and shall include the initial erection.

General:

The tendered rate for the respective traffic control facilities shall include full compensation for the supply of an initial erection complete with posts, stakes, portable stands and sandbags as may be required, for cleaning and maintenance, for covering with non-transparent material when temporarily not required and removal off the site when no longer required.

75% of the tariff will be payable when the items have been provided and erected for their first use on site and 25% when finally removed from site. Facilities which become unserviceable or are damaged by vehicles or stolen, in particular delineators, shall be replaced promptly at no additional cost.

The tendered rate shall include for the execution of all tasks and all temporary road signs required in relation to the accommodation of traffic in accordance with SANS 1921-2 (2004): Construction and Management Requirements for Works Contracts, Part 2 : Accommodation of Traffic on Public Roads occupied by the Contractor, SARTSM – Volume 2 Chapter 13.10 Signing Applications for Urban Streets

## **PSMM 8.9.2 Earthworks for temporary deviations**

Add new Sub-Clause:

Unit: km

The unit of measurement shall be the kilometer of temporary deviations shaped, compacted and constructed in accordance with the provisions of PSMM 5.5.6 of this section. Where the Contractor has to provide access roads to private property, the length of such access roads outside the road reserve shall also be included in the quantity measured for payment.

The tendered rate shall include full compensation for clearing and grubbing where necessary, the removal of small trees and stumps, the shaping and grading, watering, mixing and compacting of the material and all cuts and fills constructed from material obtained from alongside the temporary deviations or side cut, but including only such portions of the fills which are less than 0,5m in height.

## **PSMM 8.9.3 Cut and borrow to fill**

Add new Sub-Clause:

Unit: m3

The unit of measurement shall be the cubic metre of fill measured in situ from levelled cross-sections taken before and after construction where such material is either imported from a locality more than 100 m from the point of use or is utilized in a portion of a fill which is in excess of 0.5m above the original ground level.

Where measurement by cross-sections is impractical, the volume can be assumed to be equal to 70% of the loose volume measured in trucks in the case of soil and gravel material, and equal to 60% of the loose volume in trucks in the case of hard material consisting predominantly of particles of which the maximum dimension exceeds 100mm.

The tendered rate shall include full compensation for procuring, furnishing and the placing all the classes of material, including transporting over a free-haul distance of 1.0km.

**PSMM 8.9.4 Cut to spoil**

Add new Sub-Clause:

Unit: m<sup>3</sup>

The unit of measurement shall be the cubic metre of authorized excavation taken from cut in temporary deviations or removed from fill in temporary deviations which are no longer required and carted to spoil on the instructions of the Engineer, all measured in situ before excavation by means of levelled cross-sections.

The tendered rate shall include full compensation for excavating in all classes of material, loading, transporting, off loading, including the shaping and levelling of spoil material and transporting over a free-haul distance of 1.0km.

**PSMM 8.9.5 Blading by road grader of:**

Add new Sub-Clause:

Temporary deviations

Unit: km-pass

Existing gravel roads and shoulders used as temporary deviations Unit: km-pass

The unit of measurement for using a road grader to blade the surfaces of temporary deviations, existing roads and existing gravel shoulders used as temporary deviations shall be the kilometer-pass, that is, each kilometer of the full width of the temporary deviation, the entire surface of which has been bladed by one pass of the road grader. In the case of temporary deviations constructed as two separate one-way roads, they shall be considered as one full width of the temporary deviation for purposes of measurement.

Only the number of kilometer-passes actually authorised by the Engineer, in writing, will be measured.

Where the blading of temporary deviations has not been carried out satisfactorily and the surface has not been improved as much as can reasonably be expected from such an operation, the Contractor shall carry out further grading work at his own expense until a satisfactory result is obtained.

The tendered rate shall include full compensation for providing the road graders and operators, flagmen, guards, barricades, signs and all other costs incidental thereto and for blading the temporary deviations to a smooth surface free from corrugations.

**PSMM 8.9.6 Provision of access ramps**

Add new Sub-Clause:

Access Ramps for trench width suitable for DN1600 pipe	Unit: No
Access Ramps for trench width suitable for DN1400 pipe	Unit: No
Access Ramps for trench width suitable for DN1200 pipe	Unit: No
Access Ramps for trench width suitable for DN1000 pipe	Unit: No
Access Ramps for trench width suitable for DN600 pipe	Unit: No
Access Ramps for trench width suitable for DN500 pipe	Unit: No
Access Ramps for trench width suitable for DN400 pipe	Unit: No
Access Ramps for trench width suitable for DN300 pipe or smaller	Unit: No

The tendered rates are deemed to include for the requirements as specified in PSMM 5.5.18.

### C3.3.5 AMENDMENTS TO THE STANDARD SANS 1921 SPECIFICATIONS

The SANS 1921 Volumes 1, 2 and 6 - Construction and Management requirements for works standards and associated specification data are applicable.

Part 1 – General Engineering and construction works

Part 2 – Accommodation of traffic on public roads occupied by the contractor

Part 6 – HIV/AIDS awareness

The following amended specification data is applicable to this Contract:

STANDARD	CLAUSE	SPECIFICATION DATA
<b>SANS 1921-1</b>		
		<b>Essential/Additional/ Amended Data</b>
	4.1.1 (o)	<b>Amend data and add to clause as follows:</b> Record Drawings (As built drawings) to be provided within 30 days of completion of each activity which allows updates of a particular drawing. All record drawings to be submitted as a requirement for Practical Completion certification.
	4.1.2 (b)	<b>Add to sub clause:</b> All wayleave applications will be done and provided by the employer
	4.1.6	<b>Add to sub clause:</b> All spoil shall be managed in terms of the requirements of the applicable environmental legislation and environmental specifications contained here in.
	4.1.8	<b>Add to sub clause:</b> The Contractor shall issue his construction programme to the Employer, in electronic format based on the latest version of MS Project. The Contractor shall refer to the programme clause contained in the Project Specification regarding the programme requirements
	4.1.11	<b>Amend sub clause as follows:</b> One hard copy only will provided
	4.2.1	The strategy in table 1 is "A".
	4.2.2	<b>Amend sub clause as follows:</b> "structural engineer" shall read "the Engineer" or "the Employers representative" depending on applicability of conditions of contract
	4.3	<b>Add sub clause 4.3.4:</b> Refer to section named – PS Construction Programme and add to existing
	4.3.3	<b>Add to sub clause:</b> The Contractor shall provide 24 hours notification.
	4.4	<b>Add to sub clause:</b> Refer to section named – PS Quality Assurance, and add requirements as stated.
	4.7	<b>Add new sub clause 4.7.4:</b> The Contractor shall comply with specification data as stated.
	4.8	<b>Add to sub clause 4.8:</b> The Contractor shall comply with the specification data as stated.
	4.10	<b>Add sub clause 4.10.14:</b> Earthworks and resultant spoil management shall comply with the requirements of the Environmental Management Specification
	4.11.1	<b>Add to sub clause:</b>

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		The definition of "road reserve" includes the informal road reserves as encountered in informal settlements
	4.2	<b>Add to sub clauses:</b> The requirements of the particular specifications are to be met
	4.2.5	Add to sub clause: the temporary deviation plan shall be submitted to the Employer's Agent for approval. ( to be read as "the Engineer" where applicable in terms of a specific conditions of contract
	4.5	<b>Add to sub clause:</b> All costs for the maintenance of the said temporary deviations and existing roads used as temporary deviations shall be deemed to have been included in the rates as reflected in the Bill of Quantities. All existing roads used as haul roads for construction purpose shall be maintained to an applicable standard and costs for this maintenance shall be deemed to have been included in the rates shown in the Bill of Quantities.
	4.5.3	<b>Add new sub clause:</b> the Contractor shall execute a photographic survey of roads to be utilised for construction purposes and the record shall be utilised to determine facts for decision making on acceptance of responsibility for maintenance purposes
	4.6.1	<b>Add to sub clause:</b> Half width road construction, where applicable shall be limited to 500m maximum length
	4.6.3	Amend sub clause as follows: The continuous length of road under construction shall be limited to 1000m
	4.6.4	<b>Amend sub clause:</b> the number of sections under construction shall not exceed 2 and spaces between sections, not being worked on shall not be less than 500m
	4.6.5	<b>Add to sub clause:</b> Where agreement is reached with the Employers Agent that road sections shall be closed 24hours a day, this has to comply with the requirements as stated in the Traffic/Transportation Management Plan and agreed to with the Employers Agent in writing
	4.9.2 (i)	<b>Add new sub clause:</b> The Contractor shall ensure that a Traffic safety Office is appointed for the work as defined in order to be able to comply with the requirements of traffic management and control during the execution of the Works. All rates for the execution of the Works are deemed to include for this overhead as and where required
	4.10	<b>Add to sub clause:</b> Temporary Traffic Control mechanisms are detailed under the section named PA – Temporary Traffic Control Mechanisms contained in the Traffic Management Plan or Transportation Management Plan.
<b>SANS 1921-6</b>		
		<b>Essential/Additional/Amended Data</b>
	1 (e)	<b>Add to sub clause:</b> " Appointment of and HIV/AIDS Awareness Champion.
	4.2.1 (a)	<b>Add to sub clause:</b> A qualified service provider is a provider that appears on the list of recommended service providers, which is available from all regional offices of the Department of Public Works. The HIV/AIDS awareness programme shall be repeated at 6 monthly intervals for the duration of the Contract, including an initial programme at the commencement of the Contract.
	4.3.2	<b>Add to sub clause:</b> The HIV/Aids awareness champion and the Employer's representative in this regard shall certify the report and schedule described in cl 4.3.1 whenever a claim for payment is issued to the Employer.



## **C3.4: PARTICULAR SPECIFICATIONS**

### **PREAMBLE**

The Particular Specifications form an integral part of the contract and supplements the Standard Specifications. They contain a general description of the works, the site and the requirements to be met.

In the event of any discrepancy between a part or parts of the Standard or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Employer's Representative before the execution of the work under the relevant clause or item.

Where Particular Specifications differ from standard specifications, the Particular Specifications take precedence.

### C3.4.1: eTHEKWINI WATER AND SANITATION PARTICULAR SPECIFICATIONS

ITEM #	SPEC REF	DESCRIPTION
C3.4.1.1	PSOH	EWS OH&S: Site Specific Health and Safety Specification
C3.4.1.2	PSOH	EWS OH&S: Baseline Risk Assessment
C3.4.1.3	PEM	EWS Particular Specifications for Environmental Management
C3.4.1.4	PAA	EWS Particular Specifications for Daywork Schedule
C3.4.1.5	PCL	EWS Particular Specifications for Community Liaison Officer (CLO)
C3.4.1.6	PCL	EWS Particular Specifications for Code of Conduct
C3.4.1.7	STPIPE v13	EWS Particular Specifications for Steel Pipe
C3.4.1.8	MSS	Standard Mechanical Specifications
C3.4.1.9	GS	Standard Electrical Specifications
C3.4.1.10		EWS Network and Scada Specifications_Rev2
C3.4.1.11		EWS-Instrumentation Spec rev 4
C3.4.1.12		WS List of Preferred Equipment-05 December 2023-Rev 00
C3.4.1.13		Standard of Building Finishes

### C3.4.2: PROJECT PARTICULAR SPECIFICATIONS

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.1	PWW	WATERWORKS EQUIPMENT
C3.4.2.2	PSWPE	PUMPING EQUIPMENT
C3.4.2.3	PSECI	ELECTRICAL, CONTROL & INSTRUMENTATION
C3.4.2.4	PSACT	ELECTRIC ACTUATORS
C3.4.2.5	PSVS	VALVES
C3.4.2.6	PSWM	METERS
C3.4.2.7	PABR	BRICKWORK
C3.4.2.8	PSCLR	COLOUR CODING
C3.4.2.9	PSSOP	STANDARD OPERATING PROCEDURES
C3.4.2.10	PSCOM	COMMISSIONING

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.11	PSOM	OPERATIONAL AND MAINTENANCE MANUALS
C3.4.2.12	PA C	PARTICULAR SPECIFICATIONS FOR CORROSION PROTECTION OF STEEL PIPELINES (PSL3.9 SABS 1200)

**C3.4.3 AMMENDMENTS TO EWS PARTICULAR SPECIFICATIONS**

The following amendments have been made on C3.4.1.9 MSS Standard Mechanical Specifications.

**MSS.10.1.3 Systems to be used**

Replace the third paragraph with:

~~All items to be painted: Except where otherwise specified, all metal surfaces shall be painted. This includes hot-dip galvanized items and metal-sprayed coatings. In the latter case the paint shall be in the form of a sealer. Details of approved painting systems to be used are given below.~~

Items to be painted: Except where otherwise specified, all metal surfaces shall be painted. This will include hot-dip galvanized items and metal-sprayed coatings if required by the Employer. In the latter case the paint shall be in the form of a sealer. Details of approved painting systems to be used are given below.

### C3.5: CONTRACT AND STANDARD DRAWINGS

The drawings issued to tenders as part of the tender documents must be regarded as provisional and preliminary for the tender's benefit to generally assess the scope of work.

The work shall be carried out in accordance with the latest available revision of the drawings approved for construction (AFC). At commencement of the contract, the Engineer shall deliver to the Contractor copies of the AFC drawings and any instructions required for the commencement of the works. From time to time thereafter during the progress of the works, the Engineer may issue further drawings for construction purposes as may be necessary for adequate construction, completion and defects correction of the works.

All drawings and specifications and copies thereof remain the property of the Employer, and the Contractor shall return all drawings and copies thereof to the Employer at the completion of the contract.

#### CONTRACT DRAWINGS

EWS DWG NO.	DRAWING NAME
60398/01	Project Overview
60398/2	Backwash Blower, Sludge & Backwash Recovery PW
60398/3	Backwash Gallery - Blower Pipework Details
60398/3	Backwash Gallery - Blower Pipework Details
60398/3	Backwash Gallery - Blower Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Backwash Pumps - Backwash Pipework Details
60398/4	Clarifier Sludge and Blanket Pipework Details
60398/5	Backwash Recovery Pipework Details
60398/6	DN250 IV Reinforced Concrete Chamber
60398/7	DN100 Sludge & Residue IV Pre-Cast Conc Chamber
60398/8	Residue Sludge Disposal Pipework Details
60398/9	Residue Sludge Disposal Meter Chamber Det.
60398/10	Guard House
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/11	Proposed Admin Building
60398/12	Clarifiers-SS Walkways
60398/16	Standard Details
60398/17	Typical Pipe Trench Details
60398/18	GRP Access Ladder and Safety Cage Details
60398/19	Typical Security Fence Details
60398/31	General Layout Option 3 General Arrag. Live Tapping
60398/32	General Layout Option 4 General Arrag.
60398/33	General Layout Option 5 General Arrag.
60398/34	Hydraulic Profile
60398/35	Inlet Works and Mixers
60398/36	Inlet Works, Mixers, Flocculation & Channel Det

EWS DWG NO.	DRAWING NAME
60398/37	Inlet Screens
60398/38	Offtake Chamber Details & Pipe Schedule
60398/39	Offtake Chamber Details & Pipe Schedule Live Tapping
60398/40	Clarifier Launder Details
60398/41	Amendments To Polymer Storage System
60398/42	Amendments To Chlorine Storage
60398/43	Standard Details Manhole Cover
60398/44	Standard Detail Access Ladder, Handgrip & Pipe Brackets
60398/48	P&ID Inlet To Dortmund Clarifiers
60398/51	Electrical Drawings
60398/52	Schematic Single Line Diagram

### ETHEKWINI STANDARD DRAWINGS

EWS DWG NO.	DRAWING NAME
006	Precast Spacer Ring
009	Notice Board
027	Valve marker
028	No 5B Valve cover
029	No 5B Valve Cover Orientation
45001	Dirt Box Details
45002	Thrust Block Details
45003	GRP Access Ladder
45004	Wire Mesh Security Fence & Gate
45005/ 01	GRP Access Ladder: Plan, Section & Details
45005/ 02	GRP Access Ladder & Safety Cage: Plan, Section & Details
45483	DN50 - DN150 Dirt Box Revision 4 Fabrication Details
68308	1200 x 1200 GI Manhole Cover and Frame Rev D

## **C3.6: ANNEXURES**

Part C3.4 and Part 3.5 are issued separately to this document as Annexures and issued as electronic documents (pdf).for tender purposes.

- C4: SITE INFORMATION**
- C4.1: LOCALITY PLAN**
- C4.2: CONDITIONS ON SITE (GEOTECHNICAL INFORMATION)**
- C4.3: PROJECT NOTICE BOARD**



C4.1: LOCALITY PLAN

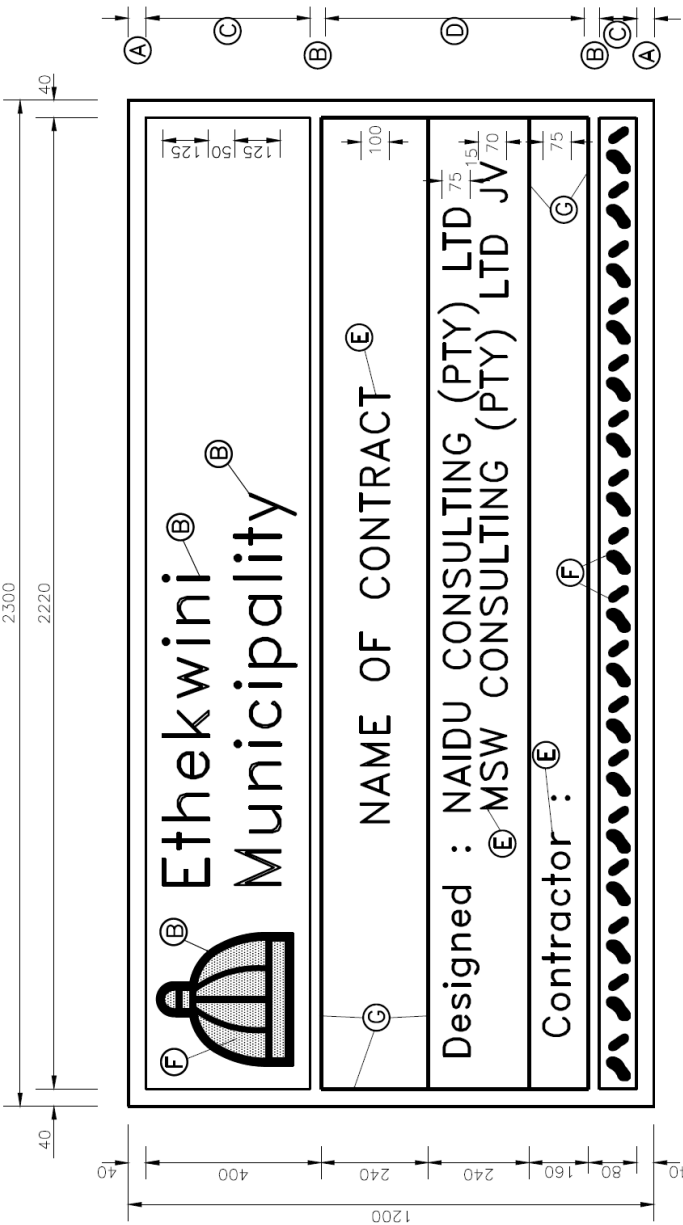


## **C4.2: CONDITIONS ON SITE (GEOTECHNICAL INFORMATION)**

The Contractor shall be deemed to have familiarised himself with the particular site conditions in terms of the requirements of the Conditions of Contract.

The Contractor is to include for any variations due to ground conditions in the tendered rates.

### C4.3: PROJECT NOTICE BOARD

 <p>The diagram shows a rectangular notice board with overall dimensions of 2300mm (width) by 1200mm (height). It is divided into several sections: a top section for the Municipality logo and name, a middle section for contract details, and a bottom section for a decorative border. Callouts A through G indicate specific materials and colors for different parts of the board and its surround. A detail of the surround shows a cross-section with dimensions 40mm, 80mm, and 40mm.</p>		
<p><b>LEGEND :</b></p> <p>A : RAISED SURROUND PAINTED WHITE</p> <p>B : WHITE</p> <p>C : BLUE BACKGROUND – F04 NATIONAL FLAG BLUE</p> <p>D : WHITE BACKGROUND</p> <p>E : BLUE LETTERS – F04 NATIONAL FLAG BLUE</p> <p>F : F29 CORNFLOWER BLUE</p> <p>G : BLUE BORDER AND DIVIDING LINE – F04 NATIONAL FLAG BLUE</p>		
<p><b>NOTE :</b></p> <p>1) THE FACE TO BE TEMPERED HARDBOARD IN ONE PIECE.</p> <p>2) THE COLOUR NUMBERS REFERRED TO ARE THOSE ON THE COLOUR SPECIFICATION OF S.A.B.S. 1091–1975 (AMENDED 1988)</p> <p>3) ALL DIMENSIONS ARE IN MILLIMETRES.</p> <p>4) ALL TEXT TO BE ROMAN DUPLEX FONT.</p>		
<p><b>DETAIL OF SURROUND</b></p>		
<p><b>ETHEKWINI MUNICIPALITY</b>      <b>WATER DESIGN BRANCH</b></p>		
Drawn by : <i>S.J.M.</i>	<h2 style="margin: 0;">NOTICE BOARD</h2>	Executive Director: _____ <b>Ethekwini Water Services</b>
Checked by : _____		Plan No: <u>  9  </u>
Date : <i>MAR 2002</i>		
Manager: Water Design		