

# HARRY GWALA DISTRICT MUNICIPALITY



## CREIGHTON WATER SUPPLY SCHEME

INVITATION TO TENDER FOR APPOINTMENT OF A SERVICE PROVIDER FOR THE  
UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY  
TO 5ML/DAY

CONTRACT No. HGDM 821/HGDM/2022

**CIDB CONTRACTOR GRADING**  
**8CE OR HIGHER**

**COMPILED BY:**  
Zimile Consulting Engineers  
76 Hope Street  
Kokstad  
4700  
Tel N°: +27 39 940 6729  
Fax N°: N/A  
Email: info@zimile.co.za

**ON BEHALF OF:**  
Harry Gwala District Municipality  
Private Bag X 501  
IXOPO  
3276  
Tel N°: +27 39 834 8700  
Fax N°: +27 39 834 2259

**OCTOBER 2023**

NAME OF TENDERER	
ADDRESS OF TENDERER	
TELEPHONE	
FAX	
TENDER SUM	

**TENDER CLOSING DATE: 12h00, 20 NOVEMBER 2023**



**EXPANDED PUBLIC WORKS PROGRAMME**  
Creating opportunities towards human fulfillment

### TENDER DOCUMENT CHECKLIST

Tenderers must complete this document checklist to ensure that all information is completed in the Tender Document.

ITEMS	CHECKED Tenderer
1) Correct Tender Offer Amount carried forward to Cover Page and Form of Offer on Section C.1 .....	<input type="checkbox"/>
2) All pages requiring signatures signed by the Tenderer .....	<input type="checkbox"/>
3) Bill of Quantities	
i) Completed in <b>BLACK INK</b> only .....	<input type="checkbox"/>
ii) Corrections crossed out and initialled.....	<input type="checkbox"/>
4) Submission of All Returnable Documents and Schedules	
A Authority for Signatory.....	<input type="checkbox"/>
B MBD Forms.....	<input type="checkbox"/>
C Schedule of work carried out by Tenderer.....	<input type="checkbox"/>
D Amendments, Qualifications and Alternatives.....	<input type="checkbox"/>
E Tax Clearance Certificate.....	<input type="checkbox"/>
F Compulsory Enterprise Questionnaire.....	<input type="checkbox"/>
G BBBEE Certificate.....	<input type="checkbox"/>
H Key Personnel .....	<input type="checkbox"/>
I Contractor's Health and Safety Declaration.....	<input type="checkbox"/>
5) J Data to be provided by Tenderer.....	<input type="checkbox"/>

**CREIGHTON WATER SUPPLY SCHEME  
CONTRACT N<sup>0</sup> HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**TABLE OF CONTENTS**

<b>PART</b>	<b>DESCRIPTION</b>	<b>PAGE COLOUR</b>	<b>PAGE No.</b>
<b>PART T: THE TENDER</b>			<b>TP 1-TP31</b>
T1.1.	Tender Notice and Invitation to Tender	White	TP 2 to TP 4
T1.2	Tender Data	Pink	TP 5 to TP 31
T2.1	Returnable Documents and Schedules	Yellow	RD 2 to RD 57
T2.2	List of Returnable Documents and Schedules	Yellow	RD 58 to RD 72
<b>PART C1: AGREEMENTS AND CONTRACT DATA</b>			<b>C 1 to C 21</b>
C1.1	Form Offer and Acceptance	Yellow	C 2 to C 6
C1.2	Contract Data	Yellow	C 7 to C 12
C1.3	Performance Guarantee	Yellow	C 13 to C 15
C1.4	Disclosure Statement	Yellow	C 16
C1.5	Agreement in terms of the Occupational Health and Safety Act No. 85 of 1993	Yellow	C 17 to C 18
C1.6	Adjudication Board Member Agreement	Yellow	C19 to C 21
<b>PART C2: PRICING DATA</b>			<b>PD 1 to PD 6</b>
C2.1	Pricing Instructions	Yellow	PD 2 to PD 5
C2.2	Schedule of Quantities	Yellow	PD 6
<b>PART C3: SCOPE OF WORK</b>			<b>SW 1 to SW 214</b>
	Scope of Work	Blue	SW 1
<b>PART C4: SITE INFORMATION</b>			<b>SI 1 to SI 4</b>
	Site Information	Green	SI 1
<b>PART C5: DRAWINGS</b>			<b>D1</b>
	Drawings	Green	D1

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT N° HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**PART T1: TENDERING PROCEDURES**

**TABLE OF CONTENTS**

T1.1: Tender Notice and Invitation to Tender .....	TP 2
T1.2: Tender Data.....	TP 5

## T1.1:Tender Notice and Invitation to Tender



### HARRY GWALA DISTRICT MUNICIPALITY INFRASTRUCTURE SERVICES DEPARTMENT

#### BID NOTICE

#### BID INVITATION

Bids are hereby invited from qualified and experienced Bidders for the supply and delivery of the following services for the Harry Gwala District municipality.

NO.	PROJECT NAME	CIDB GRADING	COMPULSORY BRIEFING DATE	TENDER NUMBER	CLOSING DATE
i.	CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY	8CE OR HIGHER	30 October 2023 at 10h00am at Harry Gwala District Municipal Boardroom. Then proceed to site.	HGDM821/HGDM/2022	20 November 2023 at 12h00

Only Bidders that have the required CIDB Grading listed on the table above will be considered. Joint Ventures are also eligible to submit Bids provided that every member of the Joint Venture is registered with the CIDB, and a combined grade of Joint Venture calculated in accordance with the CIDB regulations is equal to or higher than the specified Contractor grading.

#### **Invalid or non-submission of the following documents will lead to immediate disqualification.**

- Central Supplier database registration
- Utility bill: municipal statement/lease agreement/affidavit confirming non-payment of municipal services
- JV Agreement (if applicable).
- A signed MBD4 form must be submitted with all bids (available on our website or at reception)

#### **The following will apply in all the above bids:**

- Valid tax certificate or SARS pin.
- Price(s) quoted must be firm and must be inclusive of VAT.
- A firm delivery period must be indicated.
- All tenders must be valid for **90 days** after the tender closing date.
- Specific goals will apply to claim preferential points.
- 90/10 Preference point system will be used in Evaluation. Functionality will be calculated first.
- All tenders above R10 million must have audited annual financial statements.

**SPECIFIC GOALS**

<b>1. Ownership</b>	<b>Verification Method</b>	<b>Weighting</b>
<ul style="list-style-type: none"> <li>Black Ownership <math>\geq</math> 51%</li> </ul>	ID Copies of directors, Company registration, CSD Report and shareholder certificates.	5
<ul style="list-style-type: none"> <li>Less than 51 % owned by black people</li> </ul>	ID Copies of directors, Company registration, CSD Report and shareholder certificates.	3
<b>2. Locality</b>	<b>Verification Method</b>	<b>Weighting</b>
<ul style="list-style-type: none"> <li>Locality (Enterprise that is located within the KZN Province, location to be determined by the address registered on the CSD).</li> </ul>	CSD Report.	5
<ul style="list-style-type: none"> <li>Locality (Enterprise that is not located within the KZN Province, location to be determined by the address registered on the CSD).</li> </ul>	CSD Report.	3
<ul style="list-style-type: none"> <li><b>TOTAL POINTS</b></li> </ul>		<b>10</b>

**COLLECTION OF BID DOCUMENTS**

Bid documents may be collected from the **25 October 2023 between 09h00 to 16h00 at Harry Gwala District Municipality Offices, Finance Services Department, situated at Ixopo 40 Main Street, Ixopo 3276.**

Tender documents for the CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY will be issued upon a non-refundable cash payment of **R1000.00** each.

**NB: No documents will be sold after briefing meeting.**

**CLOSING DATE**

The closing date for the bids is as per the table above. Bids must be enclosed in **SEALED ENVELOPES** and clearly labelled with the **CONTRACT NUMBER AND PROJECT NAME** on the outside of the envelope addressed to **The Municipal Manager**.

Bids must be deposited in the Bid Box at the Reception Area of **Harry Gwala District Municipal, 40 Main Street, IXOPO**, before the closing date and time. Telegraphic, telexed or faxed bids **WILL NOT** be considered, and late bids **WILL NOT** be accepted.

Harry Gwala District Municipality does not bind itself to accept the lowest or any Bid and reserves the right to accept the whole or any part of the bid.

**BID ENQUIRIES**

**All bid enquiries and other matters shall be directed to:** Executive Director: Infrastructure Services: Mr. N Biyase during working hours on Tel.:039-834 8700.

.....  
**Mr. GM. Sineke**

**Municipal Manager**

**T1.2: Tender Data**

## GENERAL

The Conditions of Tender applicable to this contract are the Standard Conditions of Tender as contained in Annexure F of the CIDB Standard for Uniformity in Construction Procurement, including the amendment made through Board Notice 136 Government Gazette No 38960 of 10 July 2015. This document is obtainable separately. Tenderers shall obtain their own copies.

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

Each item of Tender Data given below is cross-referenced to the relevant clause in the Standard Conditions of Tender to which it mainly applies. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender. Each item of Tender Data given below is cross-referenced to the relevant clause in the Standard Conditions of Tender.

Clause Number	Description
<b>F.1</b>	<b>GENERAL</b>
<b>F.1.1.1</b>	Actions The Employer for this Contract is:  Name : Harry Gwala District Municipality Contact Name : Mr Nkululeko Biyase Address : 40 Main Street Ixopo 3276 Private Bag X501, Ixopo 3276  Tel : 039 834 8700 Fax : 039 834 2259 E-mail address : Biyasenk@harrygwaladm.gov.za



F.1.2	<p><b>Tender Documents</b> (a) <b>The Tender Document</b>, issued by the Employer consists of the following:</p> <p><b>THE TENDER</b></p> <p><b>T1: Tendering Procedures</b> T1.1: Tender Notice and Invitation to Tender T1.2: Tender Data</p> <p><b>T2 : Returnable Documents</b> T2.1: List of Returnable Documents T2.2: Returnable Schedules and Documents</p> <p><b>THE CONTRACT</b></p> <p><b>Part 1: Agreements and Contract Data</b> C1.1: Form of Offer and Acceptance C1.2: Pro-Forma Forms to be completed by successful tenderer only C1.3: Contract Data</p> <p><b>Part 2: Pricing Data</b> C2.1: Pricing Instructions C2.2: Bill of Quantities</p> <p><b>Part 3: Scope of Work</b> C3.1: Description of the Works C3.2: Engineering C3.3: Procurement C3.4: Construction Specifications</p> <p><b>Part 4: Site Information</b> C4.1: Locality Plan</p> <p><b>Part 5: Drawings</b> C5.1: Drawings</p>
F1.4	<p><b>Communication and Employer's Agent</b> <b>The Employer's Agent's (also referred to as the Engineer) details are as follows:</b></p>
	<p>Name: Zimile Consulting Engineers Address: 76 Hope Street Kokstad 4700</p> <p>Tel N<sup>o</sup>: +27 39 940 9729 Fax N<sup>o</sup>: N/A</p> <p>Contact Person: Innocent Masunungure Email: innocent@zimile.co.za</p>
F1.5	<p><b>The Employers right to accept or reject any tender offer</b> The Employer is not obliged to accept the lowest or any tender offered</p>
F.2	<p><b>TENDERER'S OBLIGATIONS</b></p>
F.2.1	<p><b>Eligibility</b></p>

	<p>A Tenderer will only be eligible to submit a tender if he/she meets all of the following criteria:</p> <p>(a) Only those Tenderers who are registered with the CIDB, in a contractor as stated in the Tender Notice and Invitation to Tender determined in accordance with Regulations 25 (1B) or 25 (7A) of the Construction Industry Development Regulations, are eligible to have their tenders evaluated</p> <p style="text-align: center;">See Returnable Documents T2.2.1 FORM A.</p> <p>(b) Joint ventures are eligible to submit tenders provided that:</p> <ol style="list-style-type: none"> <li>1. every member of the joint venture is registered with the CIDB</li> <li>2. the lead partner has a contractor grading designation in the class of construction work as specified in the Invitation to Tender.</li> <li>3. the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than the contractor grading designation required.</li> </ol> <p>(c) Only those tenderers who have in their employ management and supervisory staff satisfying the requirements of the scope of work for supervisory and management staff are eligible to submit tenders.</p> <p>(d) Tenderers are required to achieve the stipulated minimum thresholds, as per the relevant Treasury Instruction Note on local content and production. (See Returnable Documents T2.2.1 FORM J3)</p>
<p><b>F2.7</b></p>	<p><b>Site visit and clarification meeting</b>                  The arrangements for the compulsory clarification meeting and site inspection are as stated in the Tender Notice and Invitation to Tender.</p> <p>Enquiries regarding the visit (at least one full working day in advance) may be directed to:</p> <p><b>Contact : Harry Gwala District Municipality Supply Chain Management</b>  <b>Tel N°: 039 834 8773/8720</b></p> <p><b>OR</b></p> <p><b>Contact : Zimile Consulting Engineers (Consultant)</b>  <b>Tel N°: 039 940 6729</b></p>
<p><b>F.2.8</b></p>	<p><b>Seek clarification</b>                  Working days shall be defined as Monday to Friday Inclusive and shall exclude all gazetted public holidays.</p>
<p><b>F2.11</b></p>	<p><b>Alterations to documents</b></p> <p>A Tender offer shall not be considered if alterations have been made to the offer or contract data (unless such alterations have been duly authenticated by the Tenderer) or if any particulars required therein have not been completed in all respects.</p> <p>Use of correction fluid is not permitted, and the presence of correction fluid in the tender shall render the tender submission invalid.</p>
<p><b>F2.12</b></p>	<p><b>Alternative tender offers</b>                  No Alternate Offers will be accepted</p>

<b>F.2.13</b>	<b>Submitting a Tender Offer</b>
F.2.13.2	Tenderers to note that the returnable documents are listed in T.2 (Returnable Documents).
F.2.13.3	<p>Under no circumstances whatsoever may the tender forms be retyped or redrafted. Tenderers are to note that no loose documents will be accepted. All returnable documents must be separately bound and labelled.</p> <p><i>Tender offers shall be submitted as an original with one (1) copy. Where an original or certified copy of a particular returnable document is required, these shall be included as originals or certified copies, as appropriate in both the "original" and the "copy" documents.</i></p> <p>The "Copy" document need not have copies of the entire document. Parts T2.2 (Returnable Schedules and Documents), C1.1 (Form of Offer and Acceptance), C1.2 (Contract Data) and C2.2 (Bill of Quantities) shall be submitted as the "Copy" document. Failure to submit a copy document will render the tender submission invalid.</p>
F.2.13.5	<p>Delivery of Tender</p> <p>The Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are:</p> <p><b>Location of tender box :Harry Gwala District Municipality Building</b></p> <p><b>Physical address :40 Main Street, Ixopo</b></p> <p><b>Identification details : HGDM821/HGDM/2022: CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY</b></p> <p>Under no circumstances must documents be handed to an employee of Harry Gwala District Municipality or handed in at the Procurement Department. Tender documents sent via courier services must also be deposited in the Tender Box and not handed to an employee of Harry Gwala District Municipality</p> <p>Late tenders and tenders not in the tender box at the time of opening will not be accepted by the District Municipality and will be returned to the applicant unopened.</p> <p><b>NB: HGDM will not accept responsibility for tender documents which are not deposited in the Tender Box.</b></p>
F.2.13.6	A two-envelope procedure will <b>NOT</b> be followed. (Read with F.3.5 hereafter).
F.2.13.9	Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.
F.2.15.1	<p><b>Closing Time</b></p> <p>The closing time for submission of Tender Offers is as stated in the Tender Notice and Invitation to Tender</p>

F2.1.16.1	<p><b>Tender Offer Validity</b></p> <p>The Tender Offer validity period is <b>90 days</b> from the closing time for submission of tenders.</p>
F2.18	<p><b>Provide Other Material</b></p> <p>The tenderer shall, when requested by the Employer to do so, submit the names of all management and supervisory staff that will be employed together with satisfactory evidence that such staff members satisfy the eligibility criteria.</p>
F2.19	<p><b>Inspections, tests, and analyses</b></p> <p>Access shall be provided for inspections and testing by personnel acting on behalf of the Employer, subject to prior arrangement</p>
F.2.20	<p><b>Sureties, Bonds and Policies</b></p> <p>The Tenderer is required to submit with his Tender a letter of intent from an approved financial institution registered with the Financial Services Board undertaking to provide the PERFORMANCE GUARANTEE - DEMAND GUARANTEE to the format included in Part T2.2 of this procurement document.</p>
F.2.22	<p><b>Return of Tender Documents</b></p> <p>Where a tenderer who received a tender document does not submit a tender, the tender documents issued to him must be returned to the Employer within <b>35 days</b> after the closing date for submission of tenders.</p>
F.2.23	<p><b>Certificates</b></p> <p>The tenderer shall submit with his tender:</p> <p>Certificates as called for in Section T2 – Returnable Documents. Proof of qualifications and other documentation required shall only be accepted on the basis of originals and certified copies of certificates and other documents.</p> <p>Certificates as required in the Returnable Schedules and Forms must be provided with the tender for each party to a consortium / joint venture.</p>
F.3	<p><b>THE EMPLOYER'S UNDERTAKINGS</b></p>
F3.1	<p><b>Respond to requests from the tenderer</b></p> <p>Working days shall be defined as Monday to Friday Inclusive and shall exclude all gazetted public holidays</p>
F.3.4	<p><b>Opening of Tender Submissions</b></p> <p>Tenders will be opened immediately after closing time of tenders (see Tender Notice and Invitation to Tender) at the location of the tender box.</p>
F3.5	<p><b>Two-envelope system</b></p> <p>The two-envelope system will NOT be followed for this contract.</p>
F3.8	<p><b>Test for Responsiveness</b></p> <p>The minimum qualifying Functionality Evaluation Score shall be <b>65 (Sixty-five)</b> points</p>
F.3.11	<p><b>Evaluation of Tender Offers</b></p>

	The procedure for the evaluation of responsive Tenders is <b>Specific goal 1,2,3</b> (Financial Offer and Preference)
<b>F3.11.3</b>	<p><b>Specific goal 1,2,3: Functionality, Price and Preference</b></p> <p>1.1. The following preference point systems are applicable to all bids:          - The 80/20 preference point system is applicable to bids with a Rand value equal to or up to a Rand value of R50 million (all applicable taxes included); and          - The 90/10 preference point system is applicable to bids with a Rand value above R50 million (all applicable taxes included).</p> <p>1.2. The value of this bid is estimated to be more than R50 000 000 (all applicable taxes included) and therefore the 90/10 system shall be applicable.</p> <p>1.3. The points scored for price must be added to the points scored for specific goals to obtain the bidder's total points scored out of 100.</p> <p>1.4. The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.</p>
<b>F3.11.8</b>	<p><b>Scoring preferences</b></p> <p>Points for preference will be scored as set out in Returnable Documents T2.2.1 FORM L4 (MBD 6.1). The tenderer is to complete this Section to claim points for <b>Specific goal 1,2,3</b>.</p>

<b>F3.11.9</b>	<p><b>Scoring Functionality</b></p> <p>The table below lists the returnable schedules that set out the scoring criteria and sub-criteria, and the percentage weighting for the score achieved against the relevant schedule:</p> <p>The financial offer will be scored using the following formula</p> <p>90/10 preference points system for tenders with Rand value above R50 million</p> <p><b>Specific goal 1,2,3: Financial Offer, Quality and Preferences</b></p> <p><u>(a) Quality</u></p> <p>A maximum of 80 or 90 points is allocated for price on the following basis:</p> <p>90/10 preference points system for tenders with Rand value above R50 million</p> <p>The following formula must be used to calculate the points for price in respect of an invitation for tenders, with a Rand value above R50 million, inclusive of all applicable taxes</p> $P_s = 90 \left( 1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$ <p>Where-</p> <p>Ps = Points scored for price of tender under consideration;                  Pt = Price of tender under consideration; and                  Pmin = Price of lowest acceptable tender.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Description</th> <th style="text-align: center;">Maximum Allocated Points</th> </tr> </thead> <tbody> <tr> <td>Tender's Experience on Similar Projects</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Tender's Financial Standing</td> <td style="text-align: center;">20</td> </tr> <tr> <td>Key Personnel</td> <td style="text-align: center;">20</td> </tr> <tr> <td>Quality Management System</td> <td style="text-align: center;">10</td> </tr> <tr> <td><b>TOTAL MAXIMUM POINTS</b></td> <td style="text-align: center;"><b>100</b></td> </tr> </tbody> </table>	Description	Maximum Allocated Points	Tender's Experience on Similar Projects	50	Tender's Financial Standing	20	Key Personnel	20	Quality Management System	10	<b>TOTAL MAXIMUM POINTS</b>	<b>100</b>
Description	Maximum Allocated Points												
Tender's Experience on Similar Projects	50												
Tender's Financial Standing	20												
Key Personnel	20												
Quality Management System	10												
<b>TOTAL MAXIMUM POINTS</b>	<b>100</b>												

Returnable Schedule	Criteria	No of Projects completed	Points	Total Weighting %	Verification Method
Form D1	Tenderer's Experience In construction of 3MI Water Treatment Works or Higher capacity	0 Projects	0	25	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D1 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		1 Project	5		
		2 Projects	10		
		3 Projects	15		
		4 Projects	20		
		5 Projects and More	25		
Form D2	Tenderer's experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework's, mechanic works and electrical works	No of Projects completed		15	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D2 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		0 Projects	0		
		1 Project	3		
		2 Projects	6		
		3 Projects	9		
		4 Projects	12		
5 Projects and More	15				
Form D3	Tenderer's experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	No of Projects completed		10	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D3 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		0 Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
5 Projects and More	10				

	<b>Form H</b>	Financial Resources	Undoubted for your enquiry	A = 20	20	Rating by bank where account is held (Originally Stamped by Bank not older than 3 months), attached to <b>Form H</b> .	
			Good for tender amount quoted	B = 15			
			Average to good for the amount of tender enquiry, if strictly in the way of business	C = 10			
			Rating below good (D)	D-F = 5			
			Rating below F and non-complying	= 0			
				<b>Key Personnel</b>	<b>Points</b>		
	<b>Form S</b>	Experience of Key Personnel (Contracts Manager)	<b>Approved Degree/Diploma in the built environment (civil engineering) qualification and experience in the position</b>		6	Curricula Vitae to be attached to <b>FORM S</b> Key Personnel.  An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.  An originally certified (not copy of certified copy) copy of the relevant Degree or Diploma in Civil Engineering.	
			Relevant Professional Registration with ECSA or SACPCMP with 1-4 years of appropriate experience	2			
			Relevant Professional Registration with ECSA or SACPCMP with 5-7 years of appropriate experience	4		Curricula Vitae to be attached to <b>FORM S</b> Key Personnel. Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>	
			Relevant Professional Registration with ECSA or SACPCMP with 8 and above years of appropriate experience	6			
			<b>No qualification with relevant experience in the position</b>				
			Between 0 - 3 years' relevant experience in the position	0			
			Between 4 - 6 years' relevant experience in the position	1			
			Between 7 - 9 years' relevant experience in the position.	2			
			10 and above years' relevant experience in the position	3			
			<b>Key Personnel</b>	<b>Points</b>			
		Experience of Key Personnel (Site Agent)	<b>Approved Degree/Diploma in the built environment (civil engineering) qualification and experience in the position</b>		Curricula Vitae to be attached to <b>FORM S:</b> Key Personnel.  An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.  An originally certified copy (not copy of certified copy) of the relevant Degree or Diploma in Civil Engineering.		
			Relevant Professional Registration with ECSA or SACPCMP with 1-4 years of appropriate experience	2			
			Relevant Professional Registration with ECSA or SACPCMP with 5-7 years of appropriate	4			



			experience				
			Relevant Professional Registration with ECSA or SACPCMP with 8 and above years of appropriate experience	7	7	Curricula Vitae to be attached to <b>FORM S</b> Key Personnel. Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>	
			<b>No qualification with relevant experience in the position</b>				
			Between 0 - 3 years' relevant experience in the position	0			
			Between 4 - 6 years' relevant experience in the position	1			
			Between 7 - 9 years' relevant experience in the position.	2			
			10 and above years' relevant experience in the position	3			
			<b>Key Personnel</b>	<b>Points</b>		Curricula Vitae to be attached to <b>FORM S</b> Key Personnel. Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>	
		Experience of Key Personnel (Foreman)	1 - 3 years' experience in the position	1	7		
			4 - 6 years' experience in the position	3			
			7 - 9 years' experience in the position	5			
			10 and above years' experience in the position	7			
			<b>Score Status</b>	<b>Points</b>			
	<b>Form X</b>	Quality Assurance Plan and Control Procedures	Have ISO 9001 Accreditation	10	10	If selected, attach current copy of ISO Accreditation Certificates to <b>Form X</b> .	
				Have Own Internal QA Plan	6		If selected, attach copy of Internal Quality Assurance Plan to <b>Form X</b> .
				None	0		
	<b>FORM Z</b>	<b>Total Possible Points</b>			<b>100</b>		

**Tenderers that score less than 65% of the total score allowed for quality will not be considered further.**

The score allocated by each Bid Evaluation Committee member for a tender shall be the sum, of the scores relevant to each of the above listed returnable schedules multiplied by the percentage weighting for each as shown above.

**b) Financial Offer**

The financial offer will be scored using the following formula

90/10 preference points system for tenders with Rand value above R50 million

The following formula must be used to calculate the points for price in respect of an invitation for tenders, with a Rand value above R50 million, inclusive of all applicable taxes

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

Where-

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

$P_t$  = Price of tender under consideration; and

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

(c) Preferences

Up to **20** points (for financial values up to R50 000 000) or **10** points (for financial values over R50 000 000) will be awarded to tenderers who are found to be eligible for the preference claimed.

Points will be awarded to Tenderers for attaining the Specific Goal of contribution as per the preferential procurement policy framework Act, 2000: preferential procurement regulations, 2022 as detailed below. The table below was derived from preference goal 3 which is a combination of preference goals 1 and 2.

	90/10	Verification Method
Black Ownership ≥ 51 %	5	ID Copies of directors, Company registration, CSD Report and shareholder certificates
Less than 51 % owned by black people	3	ID Copies of directors, Company registration, CSD Report and shareholder certificates
Locality (Enterprise that is located within the KZN Province, location to be determined by the address registered on the CSD).	5	CSD Report
Locality (Enterprise that is not located within the KZN Province, Location to be determined by the address registered on the CSD)	3	CSD Report
<b>TOTAL</b>	<b>10</b>	

**F3.13 Acceptance of Tender Offer**

F.3.13.1 Tender offers will only be accepted if:

- the tenderer has in his or her possession an original valid Tax Clearance Certificate or SARS Pin issued by the South African Revenue Services, or has made arrangements to meet outstanding tax obligations
- the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation, by tender closing date;
- the tenderer is not in arrears for more than 3 months with the municipal rates and taxes and municipal services charges;
- the tenderer or any of its directors 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

	<p>from doing business with the public sector;</p> <ul style="list-style-type: none"> <li>e) the tender has not             <ul style="list-style-type: none"> <li>i) abused the Employer's Supply Chain Management System; or</li> <li>ii) failed to perform on any previous contract and has been given a written notice to this effect; and</li> </ul> </li> <li>f) has completed the Compulsory Enterprise Questionnaires and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interest of the employer or potentially compromise the tender process.</li> <li>g) the Tenderer or a competent authorized representative of the Contractor who submitted the tender has attended the compulsory clarification meeting and/or site inspection, as specified;</li> <li>h) the tender offer is signed by a person authorized to sign on behalf of the Tenderer;</li> <li>i) a Tenderer who submitted a tender as a Joint Venture has included an acceptable Joint Venture Agreement with his tender.</li> </ul>
<p><b>F.3.17</b></p>	<p><b>Provide Copies of the Contract</b> The number of paper copies of the signed contract to be provided by the Employer is: <b>one</b>.</p>
<p><b>F3.20</b></p>	<p><b>Mandatory Sub-Contracting.</b> The successful tenderer will be required to subcontract a portion of the works to designated groups as per the contract data.</p>

## **APPENDIX: STANDARD CONDITIONS OF TENDER**

*(These Standard Conditions of Tender have been reproduced, without any changes, from Appendix A of the CIDB Standardized Construction Procurement Documentation for Engineering Construction Works (5 August 2005))*

### **F.1 General**

#### **F.1.1 Actions**

**F1.1.1.** The employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in F.2 and F.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

**F1.1.2.** The employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note 1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of the person to act properly in his or her position even if no improper acts result.

2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decision taken.

**F.1.1.3** The employer shall not seek, and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

#### **F.1.2 Tender Documents**

The documents issued by the employer for the purpose of a tender offer are listed in the tender data.

#### **F.1.3 Interpretation**

**F.1.3.1** The tender data and additional requirements contained in the tender schedules that are included in the returnable documents are deemed to be part of these conditions of tender.

**F.1.3.2** These conditions of tender, the tender data and tender schedules which are only required for tender evaluation purposes, shall not form part of any contract arising from the invitation to tender.

**F.1.3.3** For the purposes of these conditions for the calling for expressions of interest, the following definitions apply:

- (a) **conflict of interest** means any situation in which
  - i) someone in a position of trust has competing professional or personal interest which make it difficult to fulfil his or her duties impartially;
  - ii) an individual or organisation is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or
  - iii) incompatibility or contradictory interests exist between an employee and the organisation which employs that employee.
- (b) **comparative offer** means the tenderer's financial offer after the factors of non-firm prices, all unconditional discounts and any other tendered parameters that will affect the value of the financial offer have been taken into consideration
- (c) **corrupt practice** means the offering, giving, receiving, or soliciting of anything of value to influence the action of the employer or his staff or agents in the tender process; and
- (d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels
- (e) **Organisation** means a company, firm, enterprise, association or other legal entity, whether incorporated or not, or a public body
- (f) **Quality (functionality)** means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

#### **F.1.4 Communication and employer's agent**

Each communication between the employer and a tenderer shall be to or from the employer's agent only, and in a form that can be read, copied, and recorded. Writing shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the employer's agent are stated in the tender data.

#### **F.1.5 The employer's right to accept or reject any tender offer**

**F.1.5.1** The employer may accept or reject any variation, deviation, tender offer, or alternative tender offer, and may cancel the tender process and reject all tender offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a tenderer for such cancellation and rejection but will give reasons for such action upon written request to do so.

**F.1.5.2** The employer may not be subsequent to the cancellation or abandonment of a tender process, or the rejection of all tender offers re-issue a tender covering substantially the same scope of work within a period of six months unless only one tender was received and such tender was returned unopened to the tenderer.

#### **F.1.6 Procurement Procedures**

##### **F.1.6.1 General**

Unless otherwise stated in the tender data, a contract will, subject F.3.13, be concluded with the tenderer who in terms of F.3.11 is the highest ranked or the tenderer scoring the highest number of

tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

### **F.1.6.2 Competitive Negotiation Procedure**

**F.1.6.2.1** Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of F.3.4, the Employer shall announce only the names of the tenderers who make a submission. The requirements of F.3.8 relating to the material deviations or qualifications which affect the competitive positions of tenderers shall not apply.

**F.1.6.2.2** All responsive tenderers, or not less than three responsive tenderers that are highest ranked in terms of the evaluation method and evaluation criteria stated in the data, shall be invited in each round to enter the competitive negotiations, based on the principle of equal treatment, and keeping confidential the proposed solutions and associated information. Notwithstanding the provisions of F.2.17, the Employer may request that tenders be clarified, specified, and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning and additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

**F.1.6.2.3** At the conclusion of each round of negotiations, tenderers shall be invited by the Employer to make a fresh tender offer, based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.

**F.1.6.2.4** The contract shall be awarded in accordance with the provisions of F.3.11 and F.3.13 after tenderers have been requested to submit their best and final offer.

### **F.1.6.3 Proposal Procedure using two stage system**

#### **F.1.6.3.1 Option 1**

Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The Employer shall evaluate each responsive submission in terms of the method of evaluation stated in the tender data, and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.

#### **F.1.6.3.2 Option 2**

**F.1.6.3.2.1** Tenderers shall submit in the first stage only technical proposals. The Employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.

**F.1.6.3.2.2.** The Employer shall evaluate tenders received during the second stage in terms of the method of evaluation stated in the tender data and award the contract in terms of these conditions of tender.

## **F.2 Tenderer's obligations**

### **F.2.1 Eligibility**

**F.2.1.1** Submit a tender offer only if the tenderer complies with the criteria stated in the tender data and the tenderer, or any of his principals, is not under any restriction to do business with employer.

**F.2.1.2** Notify the Employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the Employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the Employer's written approval prior to do so prior to the closing time of tenders.

**F.2.2 Cost of tendering**

Accept that the employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

**F.2.3 Check documents**

Check the tender documents on receipt for completeness and notify the employer of any discrepancy or omission.

**F.2.4 Confidentiality and copyright of documents**

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a tender offer in response to the invitation.

**F.2.5 Reference documents**

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

**F.2.6 Acknowledge addenda**

Acknowledge receipt of addenda to the tender documents, which the employer may issue, and if necessary, apply for an extension to the closing time stated in the tender data, in order to take the addenda into account.

**F.2.7 Site visit and clarification meeting**

Attend, where required, a site visit and clarification meeting at which tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the tender data.

**F.2.8 Seek clarification**

Request clarification of the tender documents, if necessary, by notifying the employer at least five working days before the closing time stated in the tender data.

**F.2.9 Insurance**

Be aware that the extent of insurance to be provided by the employer (if any) may not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance.



### **F.2.10 Pricing the tender offer**

- F.2.10.1** Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes (except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes, and levies being those applicable 14 days before the closing time stated in the tender data.
- F.2.10.2** Show VAT payable by the employer separately as an addition to the tendered total of the prices.
- F.2.10.3** Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.
- F.2.10.4** State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

### **F.2.11 Alterations to documents**

Not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

### **F.2.12 Alternative tender offers**

- F.2.12.1** Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted. The alternative tender offer is to be submitted with the main tender offer together with a schedule that compares the requirements of the tender documents with the alternative requirements the tenderer proposes.
- F.2.12.2** Accept that an alternative tender offer may be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

### **F.2.13 Submitting a tender offer**

- F.2.13.1** Submit one tender offer only, either as a single tendering entity or as a member in joint venture, to provide the whole of the works, services or supply identified in the contract data, unless stated otherwise in the tender data.
- F.2.13.2** Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing in black ink.
- F.2.13.3** Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.
- F.2.13.4** Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the

signatories is the lead partner whom the employer shall hold liable for the purpose of the tender offer.

**F.2.13.5** Seal the original and each copy of the tender offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

**F.2.13.6** Where a two-envelope system is required in terms of the tender data, place and seal the returnable documents listed in the tender data in an envelope marked "financial proposal" and place the remaining returnable documents in an envelope marked "technical proposal". Each envelope shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

**F.2.13.7** Seal the original tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the tender data.

**F.2.13.8** Accept that the employer shall not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

**F.2.13.9** Accept that tender offers submitted by facsimile or email will be rejected by the Employer, unless stated otherwise in the tender data.

**F.2.14 Information and data to be completed in all respects**

Accept that tender offers, which do not provide all the data or information requested completely and, in the form required, may be regarded by the employer as non-responsive.

**F.2.15 Closing time**

**F.2.15.1** Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Proof of posting shall not be accepted as proof of delivery. The employer shall not accept tender offers submitted by telegraph, telex, facsimile, or e-mail, unless stated otherwise in the tender data.

**F.2.15.2** Accept that, if the employer extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

**F.2.16 Tender offer validity**

**F.2.16.1** Hold the tender offer(s) valid for acceptance by the employer at any time during the validity period stated in the tender data after the closing time stated in the tender data.

**F.2.16.2** If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period.

**F.2.16.3** Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted.

**F.2.16.4** Where a tender submission is to be substituted, submit a substitute tender in accordance with the requirements of F.2.13 with the packages clearly marked as "SUBSTITUTE".

**F.2.17 Clarification of tender offer after submission**

Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

**F.2.18 Provide other material**

**F.2.18.1** Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

**F.2.18.2** Dispose of samples of materials provided for evaluation by the employer, where required.

**F.2.19 Inspections, tests, and analysis**

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

**F.2.20 Submit securities, bonds, policies, etc.**

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

**F.2.21 Check final draft**

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

**F.2.22 Return of other tender documents**

If so, instructed by the employer, return all retained tender documents within 28 days after the expiry of the validity period stated in the tender data.

**F.2.23 Certificates**

Include in the tender submission or provide the employer with any certificates as stated in the tender data.

**F.3 The employer's undertakings**

**F.3.1 Respond to requests from the tenderer**

**F.3.1.1** Respond to a request for clarification received up to five working days prior to the tender closing time stated in the Tender Data and notify all tenderers who drew procurement documents.

**F.3.1.2** Consider any request to make material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

- a) An individual firm, or joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements.
- b) The new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or
- c) In the opinion of the Employer, acceptance of the material change would compromise the prequalification process.

### **F.3.2 Issue Addenda**

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date of the Tender Notice until seven days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, will then notify it to all tenderers who drew documents.

### **F.3.3 Return late tender offers**

Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

### **F.3.4 Opening of tender submissions**

**F.3.4.1** Unless the two-envelope system is to be followed, open valid tender submissions in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

**F.3.4.2** Announce at the opening held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened, the total of his prices, preferences claimed and time for completion, if any, for the main tender offer only.

**F.3.4.3** Make available the record outlined in F.3.4.2 to all interested persons upon request.

### **F.3.5 Two-envelope system**

**F.3.5.1** Where stated in the tender data that a two-envelope system is to be followed, open only the technical proposal of valid tenders in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data and announce the name of each tenderer whose technical proposal is opened.

**F.3.5.2** Evaluate the quality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the quality evaluation above the minimum number of points for quality stated in the tender data, and announce

the score obtained for the technical proposals and the total price and any preferences claimed. Return unopened financial proposals to tenderers whose technical proposals failed to achieve the minimum number of points for quality.

### **F.3.6 Non-disclosure**

Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

### **F.3.7 Grounds for rejection and disqualification**

Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

### **F.3.8 Test for responsiveness**

**F.3.8.1** Determine, on opening and before detailed evaluation, whether each tender offer properly received:

- (a) meets the requirements of these Conditions of Tender,
- (b) has been properly and fully completed and signed, and
- (c) is responsive to the other requirements of the tender documents.

**F.3.8.2** A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer's opinion, would:

- detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
- change the Employer's or the tenderer's risks and responsibilities under the contract, or
- affect the competitive position of other tenderers presenting responsive tenders if it were to be rectified.

Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

### **F.3.9 Arithmetical errors**

**F.3.9.1** Check responsive tender offers for arithmetical errors between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.

**F.3.9.2** Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tenders in accordance with F.3.11 for:

- a) The gross misplacement of the decimal point in the unit rate,
- b) Omissions made in completing the pricing schedule or bills of quantities or
- c) Arithmetic errors in

- Line-item totals resulting from the product of unit rate and a quantity in bills of quantities or schedule of prices; or
- The summation of the prices.

**F3.9.2** Notify the tenderers of all errors or omissions that are identified in the tender offer and invite the tenderer to either confirm the tender offer as tendered or accept the corrected total of prices.

**F.3.9.3** Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

- a) If bills of quantities or pricing schedules apply and there is an error in the line-item total resulting from the product of the unit rate and the quantity, the line item total as quoted shall govern, and the unit rate will be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line-item total as quoted shall govern and the unit rate shall be corrected.
- b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern, and the tenderer will be asked to revise selected item prices (and their rates if a bill of quantities applies) to achieve the tendered total of the prices.

Consider the rejection of a tender offer if the tenderer does not correct or accept the correction of his arithmetical errors in the manner described above.

### **F.3.10 Clarification of a tender offer**

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer.

### **F.3.11 Evaluation of tender offers**

#### **F3.11.1 General**

Appoint an evaluation panel of not less than three persons. Reduce each responsive tender offer to a comparative offer and evaluate them using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

#### **F.3.11.2 Preference Goal 1: Ownership as specific goal**

1. A maximum of 20 points (80/20 preference points system) or 10 (90/10) preference points system), may be allocated. Bidder may score preference points based on company ownership.
  - a) business enterprise which is at least 51% owned by black people.
  - b) business enterprise which is at least 51% owned by black people who are youth
  - c) business enterprise which is at least 51% owned by black people who are women
  - d) business enterprise which is at least 51% owned by black with disabilities
  - e) a co-operative which is at least 51% owned by black people which is at least 51% owned by black people who are military veterans
2. Ownership verification may be conducted through the Companies and Intellectual Property Commission (CIPC) and CSD.

### F.3.11.3 Preference Goal 2: RDP Goals

1. The following activities may be regarded as a contribution towards achieving the goals of the RDP (published in Government Gazette No. 16085 dated 23 November 1994):

- (a) The promotion of South African owned enterprises;
- (b) The promotion of export orientated production to create jobs;
- (c) The promotion of SMMEs;
- (d) The creation of new jobs or the intensification of labour absorption;
- (e) The promotion of enterprises located in a specific province for work to be done or services to be rendered in that province;
- (f) The promotion of enterprises located in a specific region for work to be done or services to be rendered in that region;
- (g) The promotion of enterprises located in a specific municipal area for work to be done or services to be rendered;
- (h) The promotion of enterprises located in rural areas;
- (i) The empowerment of the work force by standardising the level of skill and knowledge of workers;
- (j) The development of human resources, including by assisting in tertiary and other advanced training programmes, in line with key indicators such as percentage of wage bill spent on education and training and improvement of management skills; and
- (k) The upliftment of communities through, but not limited to, housing, transport, schools, infrastructure donations, and charity organisations

3. Address declared by the prospective bidder in the National Treasury Central Supplier Database (CSD) or in the Harry Gwala Municipal supplier database shall be used to determine the location of a business enterprise for the purposes of allocating preference points for (e), (f), (g) and (h) above.

### F.3.11.4 Preference Goal 3: Combinations of any other Goals

- 1) The municipality may also combine any specific goals above in a manner that will help them evaluate and apply preference points to tenders
- 2) The municipality shall set appropriate Local Economic Development Targets in the form of Contract Participation Goals and or Targeted Procurement objectives which must form part of the invitation to tender, set as performance criteria within contracts.

### F.3.11.5 Decimal places

Points scored must be rounded off to the nearest 2 decimal places.

### F.3.11.6 Scoring Price

Score price of remaining responsive tender offers using the following formula:

$$N_{FO} = W_1 \times A$$

where:

$N_{FO}$  is the number of tender evaluation points awarded for price.

$W_1$  is the maximum possible number of tender evaluation points awarded for price as stated in the Tender Data.

A is a number calculated using the formula and option described in Table F.1 as stated in the Tender Data.

Table F.1: Formulae for calculating the value of A

Formula	Comparison aimed at achieving	Option 1 <sup>a</sup>	Option 2 <sup>a</sup>
1	Highest price or discount	$A = (1 + (P - P_m)) P_m$	$A = P / P_m$
2	Lowest price or percentage commission / fee	$A = (1 - (P - P_m)) P_m$	$A = P_m / P$
<sup>a</sup> $P_m$ is the comparative offer of the most favourable comparative offer. $P$ is the comparative offer of the tender offer under consideration.			

### F.3.11.8 Scoring preferences

Confirm that tenderers are eligible for the preferences claimed in accordance with the provisions of the tender data and reject all claims for preferences where tenderers are not eligible for such preferences. Calculate the total number of tender evaluation points for preferences claimed in accordance with the provisions of the tender data.

### F.3.11.9 Scoring functionality

Score each of the criteria and sub-criteria for quality in accordance with the provisions of the Tender Data.

Calculate the total number of tender evaluation points for quality using the following formula:

$$NQ = W2 \times SO / MS$$

where:

*SO* is the score for quality allocated to the submission under consideration;

*MS* is the maximum possible score for quality in respect of a submission; and

*W2* is the maximum possible number of tender evaluation points awarded for the quality as stated in the tender data

### F.3.12 Insurance provided by the employer

If requested by the proposed successful tenderer, submit for the tenderer's information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the employer to provide.

### F.3.13 Acceptance of tender offer

Accept the tender offer, if in the opinion of the employer, it does not present any risk and only if the tenderer:

- a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,
- b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise, and the personnel, to perform the contract,



- c) has the legal capacity to enter into the contract,
- d) is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by **a court or a** judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,
- e) complies with the legal requirements, if any, stated in the tender data, and
- f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

**F.3.14 Prepare contract documents**

**F.3.14.1** If necessary, revise documents that shall form part of the contract and that were issued by the employer as part of the tender documents to take account of:

- a) addenda issued during the tender period,
- b) inclusion of some of the returnable documents, and
- c) other revisions agreed between the employer and the successful tenderer.

**F.3.14.2** Complete the schedule of deviations attached to the form of offer and acceptance, if any.

**F.3.15 Complete adjudicator's contract**

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

**F.3.16 Notice to unsuccessful tenderers**

**F.3.16.1** Notify the successful tenderer of the employer's acceptance of his tender offer by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the tender data or agreed additional period.

**F.3.16.2** After the successful tenderer has been notified of the employer's acceptance of the tender, notify other tenderers that their tender offers have not been accepted.

**F.3.17 Provide copies of the contracts**

Provide to the successful tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

**F.3.18 Provide written reasons for actions taken**

Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

**F3.19 Transparency in the procurement process**

**F3.19.1** The CIDB prescripts require that tenders must be advertised and be registered on the CIDB iTender system.

- F3.19.2** The employer must adopt a transparency model that incorporates the disclosure and accountability as transparency requirements in the procurement process.
- F3.19.3** The transparency model must identify the criteria for selection of projects, project information template and the threshold value of the projects to be disclosed in the public domain at various intervals of delivery of infrastructure projects.
- F3.19.4** The client must publish the information on a quarterly basis which contains the following information:
- Procurement planning process
  - Procurement method and evaluation process
  - Contract type
  - Contract status
  - Number of firms tendering
  - Cost estimate
  - Contract title
  - Contract firm(s)
  - Contract price
  - Contract scope of work
  - Contract start date and duration
  - Contract evaluation reports
- F3.19.5** The employer must establish a Consultative Forum which will conduct a random audit in the implementation of the transparency requirements in the procurement process.
- F3.19.6** Consultative Forum must be an independent structure from the bid committees.
- F3.19.7** The information must be published on the employer's website.
- F 3.19.8** Records of such disclosed information must be retained for audit purposes.

**CREIGHTON WATER SUPPLY SCHEME****UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY****CONTRACT No. HGDM 821/HGDM/2022****PART T2: RETURNABLE DOCUMENTS AND SCHEDULES****INDEX**

<b>PART T2.1:</b>	<b>LIST OF RETURNABLE DOCUMENTS AND SCHEDULES .....</b>	<b>2</b>
<b>FORM A:</b>	<b>Certificate of Attendance at Clarification Meeting .....</b>	<b>4</b>
<b>FORM B:</b>	<b>Authority for Signatory .....</b>	<b>5</b>
<b>FORM C:</b>	<b>Certificate of Registration with CIDB .....</b>	<b>7</b>
<b>FORM D 1:</b>	<b>Schedule of Work Carried out by the Tenderer .....</b>	<b>8</b>
<b>FORM D 2:</b>	<b>Schedule of Work Carried out by the Tenderer .....</b>	<b>12</b>
<b>FORM D 3:</b>	<b>Schedule of Work Carried out by the Tenderer .....</b>	<b>16</b>
<b>FORM E:</b>	<b>Preliminary Programme.....</b>	<b>20</b>
<b>FORM F:</b>	<b>Amendments, Qualifications and Alternatives .....</b>	<b>21</b>
<b>FORM G:</b>	<b>SARS PIN .....</b>	<b>23</b>
<b>FORM H:</b>	<b>Tenderer's Financial Standing .....</b>	<b>24</b>
<b>FORM I:</b>	<b>Form of Intent to Provide a Performance Guarantee .....</b>	<b>26</b>
<b>FORM J :</b>	<b>Compulsory Enterprise Questionnaire .....</b>	<b>27</b>
<b>FORM K:</b>	<b>Proof of Purchase of Tender Documents .....</b>	<b>29</b>
<b>FORM L1:</b>	<b>MBD2 Form (Tax clearance certificate requirements).....</b>	<b>30</b>
<b>FORM L2:</b>	<b>MBD4 FORM (TAX CLEARANCE CERTIFICATE REQUIREMENTS) .....</b>	<b>31</b>
<b>FORM L3:</b>	<b>MBD5 FORM (DECLARATION FOR PROCUREMENT ABOVE R10 MILLION) .....</b>	<b>34</b>
<b>FORM L4:</b>	<b>MBD6.1 FORM (PREFERENTIAL PROCUREMENT) .....</b>	<b>36</b>
<b>FORM M1:</b>	<b>MBD7.1 FORM (CONTRACT FORM – PURCHASE OF GOODS/WORKS) .....</b>	<b>43</b>
<b>FORM M2:</b>	<b>MBD7.2 FORM (CONTRACT FORM – RENDERING OF SERVICES) .....</b>	<b>45</b>
<b>FORM N1:</b>	<b>MBD8 FORM (DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES) .....</b>	<b>47</b>
<b>FORM N2:</b>	<b>MBD9 FORM (CERTIFICATE OF INDEPENDENT BID DETERMINATION).....</b>	<b>49</b>
<b>FORM O:</b>	<b>Joint Venture Disclosure Form .....</b>	<b>52</b>
<b>FORM P:</b>	<b>Schedule of Construction Plant &amp; Equipment .....</b>	<b>58</b>
<b>FORM Q:</b>	<b>Schedule of Proposed Sub-Contractors.....</b>	<b>59</b>
<b>FORM R:</b>	<b>Record of Addenda to Tender Documents .....</b>	<b>60</b>
<b>FORM S:</b>	<b>Key Personnel .....</b>	<b>61</b>
<b>FORM T:</b>	<b>Rates for Special Materials .....</b>	<b>63</b>
<b>FORM U:</b>	<b>Contractor's Health and Safety Declaration .....</b>	<b>64</b>
<b>FORM V:</b>	<b>UIF Registration Certificate.....</b>	<b>66</b>
<b>FORM W:</b>	<b>Certificate of Municipal Services.....</b>	<b>67</b>
<b>FORM X:</b>	<b>Quality Management System (Quality Assurance Plan &amp; Control .....</b>	<b>69</b>
<b>FORM Y:</b>	<b>Supply Chain Management Policy.....</b>	<b>70</b>
<b>FORM Z:</b>	<b>Total Score (Functionality).....</b>	<b>72</b>

## **PART T2.1: LIST OF RETURNABLE DOCUMENTS AND SCHEDULES**

### **1. List of Returnable Documents and Schedules Required for Tender Evaluation Purposes**

- Certificate Of Attendance at Clarification Meeting
- Authority For Signatory
- Certificate Of Registration with CIDB
- Schedule Of Work Carried Out by The Tenderer
- Preliminary Programme
- Amendments, Qualifications and Alternatives
- Sars Pin
- Tenderers Financial Standing
- Form Of Intent to Provide A Performance Guarantee
- Compulsory Enterprise Questionnaire
- Proof Of Purchase of Tender Documents
- MBD2 Form (Tax Clearance Certificate Requirements)
- MBD4 Form (Tax Clearance Certificate Requirements)
- MBD5 Form (Declaration for Procurement Above R10 Million)
- MBD6.1 Form (Preferential Procurement)
- MBD7.1 Form (Contract Form – Purchase of Goods/Works)
- MBD7.2 Form (Contract Form – Rendering of Services)
- MBD8 Form (Declaration of Bidder's Past Supply Chain Management Practices)
- MBD9 Form (Certificate of Independent Bid Determination)
- Joint Venture Disclosure Form
- Schedule Of Construction Plant & Equipment
- Schedule Of Proposed Sub-Contractors
- Record Of Addenda to Tender Documents
- Key Personnel
- Rates For Special Materials
- Contractor's Health and Safety Declaration
- UIF Registration Certificate
- Certificate Of Municipal Services
- Quality Management System (Quality Assurance Plan & Control
- Supply Chain Management Policy
- Total Score (Functionality)

### **2. Other Returnable Schedules and Documents that Will be Incorporated into the Contract**

- Schedule of Construction Plant & Equipment
- Schedule of Proposed Sub-Contractors
- Record of Addenda to Tender Documents
- Key Personnel
- Rates for Special Materials
- Contractor's Health and Safety Declaration
- UIF Registration Certificate
- Certificate of Municipal Services
- Quality Management System (Quality Assurance Plan & Control
- Supply Chain Management Policy
- Total Score (Functionality)
- Form of Offer and Acceptance (Part C1)
- Contract Data (Part C1)
- Form of Guarantee (Part C1)
- Adjudicator's Agreement (Part C1)

- Agreement in Terms of the OHS Act No 85 of 1993 (Part C1)
- Bill of Materials (Part C2)
- Scope of Work (Part C3)
- Site information (Part C4)
- Drawings (Part C5)

**FORM A: Certificate of Attendance at Clarification Meeting**

**CONTRACT N° HGDM 821/HGDM/2022**

**CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

(Please print)

It is hereby CERTIFIED that I, ..... (name)  
in my capacity as.....and a duly authorized  
representative of..... (the TENDERER)  
of (address).....  
in the company of.....(the ENGINEER)  
attended the official Site Inspection on .....(date)  
for and on behalf of the above-named Tenderer.

I hereby further DECLARE that I am satisfied with the description of the Works and the explanations given by the above-named Engineer.

SIGNATURE .....  
(On behalf of TENDERER)

DATE .....

**AS WITNESS :-**  
(On behalf of ENGINEER)

NAME .....

SIGNATURE .....

DATE .....

**FORM B: Authority for Signatory**

Indicate the status of the tenderer by ticking the appropriate box hereunder. The tenderer must complete the certificate set out below for the relevant category.

A Company	B Partnership	C Joint Venture	D Sole Proprietor	E Close Corporation

**A. Certificate for Company**

I, ....., chairperson  
of the board of .....

hereby confirm that by resolution of the board (copy attached) taken on

..... 20....., Mr/Ms .....

acting in the capacity of ....., was authorised to sign all documents in connection with this tender for **CONTRACT N° HGDM 821/HGDM/2022** and any contract resulting from it on behalf of the company.

**As witnesses:**

1. .... Chairman: .....

2. .... Date: .....

Signature of Authorised Person: .....

**B. Certificate for Partnership**

We, the undersigned, being the key partners in the business trading as .....

....., hereby authorise

Mr/Ms ....., acting in the capacity of .....

....., to sign all documents in connection with this tender for

**CONTRACT N° HGDM 821/HGDM/2022** and any contract resulting from it on our behalf.

Name	Address	Signature	Date

*Note: This certificate is to be completed and signed by all key partners upon whom rests the direction of the affairs of the Partnership as a whole.*

Signature of Authorised Person: .....

**C. Certificate of Joint Venture**

We, the undersigned, are submitting this tender offer in Joint Venture and hereby

authorise Mr/Ms ....., authorised signatory of the company

....., acting in the capacity of lead partner, to sign all documents in connection with this tender for **CONTRACT N° HGDM 821/HGDM/2022** and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Name of Firm	Address	Authorising Name and Capacity	Authorising Signature
Lead Partner:			

Signature of Authorised Person: .....

**D. Certificate for Sole Proprietor**

I, ....., hereby confirm that I am

the sole owner of the business trading as .....

**As witnesses:**

1. .... Sole Owner: .....

2. .... Date: .....

Signature of Authorised Person: .....

**E. Certificate for Close Corporation**

We, talculations must be set out in a clear and logical sequence and must clearly re

ect all design assumptions in the development of the pricing proposal.

Acceptance of an alternative tender offer will mean acceptance in principle of the offer. It will be an obligation of the c° **HGDM 821/HGDM/2022** and any contract resulting from it on our behalf.

Name	Address	Signature	Date

*Note: This certificate is to be completed and signed by all key partners upon whom rests the direction of the affairs of the Partnership as a whole.*

Signature of Authorised Person: .....



**FORM C: Certificate of Registration with CIDB**

The Tenderer is to attach a copy (ies) of Tenderer's Registration with CIDB or alternatively furnish the CIDB registration number and details in the table below. This information will be verified with the CIDB through the CIDB website. It is the Tenderer's responsibility to ensure that their details are displayed on the website. If a joint venture is tendering, details of all the JV members are to be furnished.

Name of Tenderer/Contractor	CIDB Registration Number	Category and Class of Registration e.g. 1CE

My/Our failure to submit the certificate(s) or furnish the required details with my/our tender document will lead to the conclusion that I/we are not registered with CIDB and therefore are not eligible to tender.

SIGNATURE: .....  
 (of person authorised to sign on behalf of the Tenderer)

DATE: .....

**FORM D 1: Schedule of Work Carried out by the Tenderer**

The Tenderer shall list below all civil engineering contracts of Water projects. This information is material to the award of the Contract. List here Tenderer's Experience In construction of 3MI Water Treatment Works or Higher capacity

D1	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D1 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience In construction of 3MI Water Treatment Works or Higher capacity	No Projects					0 Projects	0	
	Name of Project 1 : Capacity of Water Treatment Works :					1 Projects	5	
	Name of Project 2 : Capacity of Water Treatment Works :					2 Projects	10	
Signature (of person authorised to sign on behalf of the tenderer) : .....						Date:.....		

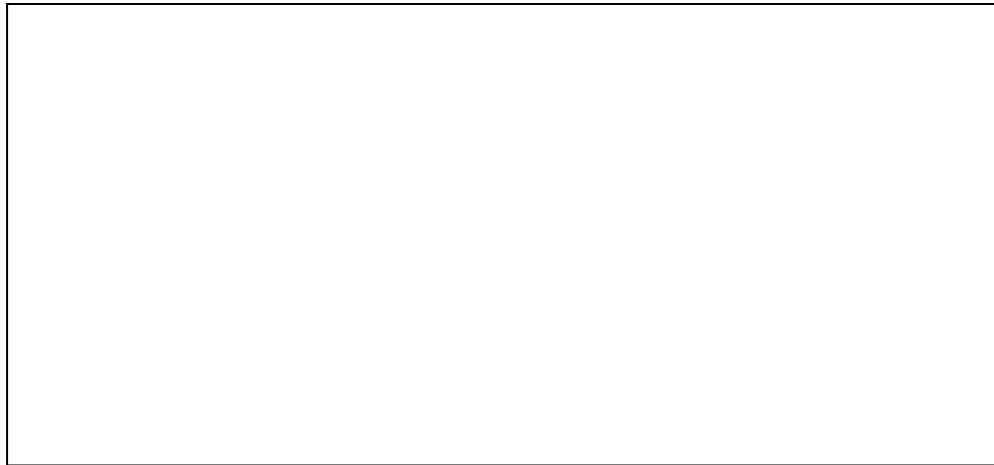
D1	List below works undertaken for each discipline/category as main contractor A <b>SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D1 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience In construction of 3MI Water Treatment Works or Higher capacity	Name of Project 3 : Capacity of Water Treatment Works :					3 Projects	15	
	Name of Project 4 : Capacity of Water Treatment Works :					4 Projects	20	
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

D1	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D1 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience In construction of 3MI Water Treatment Works or Higher capacity	<p><b>Name of Project 5 :</b></p> <p><b>Capacity of Water Treatment Works :</b></p>					5 Projects and More	25	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	<b>25</b>	
						Actual Points Obtained <b>D1</b> =		

Clients Name : .....

Name of Project: : .....

Capacity of water treatment works : .....ML



CLIENTS OFFICIAL STAMP

.....  
SIGNATURE(S) OF CLIENTS REPRESENTATIVE

**Signatures of the respective client to be added on this form for each project. Where there is more than one project, this form should be duplicated for the respective number of projects used.**

**FORM D 2: Schedule of Work Carried out by the Tenderer**

The Tenderer shall list below all civil engineering contracts of Water projects. This information is material to the award of the Contract. List here Tenderer's experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework's, mechanic works and electrical works

D2	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D2 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework's, mechanic works and electrical works	No Projects					0 Projects	0	
	Name of Project 1 : Pumping Nominal Flow Rate : ℓ/sec Pumping Head : m					1 Projects	3	
	Name of Project 2 : Pumping Nominal Flow Rate : ℓ/sec Pumping Head : m					2 Projects	6	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		

D2	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D2 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework' s, mechanic works and electrical works	<p><b>Name of Project 3</b> :</p> <p><b>Pumping Nominal Flow Rate</b> : ℓ/sec</p> <p><b>Pumping Head</b> : m</p>					3 Projects	9	
	<p><b>Name of Project 4</b> :</p> <p><b>Pumping Nominal Flow Rate</b> : ℓ/sec</p> <p><b>Pumping Head</b> : m</p>					4 Projects	12	
Signature (of person authorised to sign on behalf of the tenderer) : ..... Date:.....								

D2	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D2 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework' s, mechanic works and electrical works	<p><b>Name of Project</b> 5 :</p> <p><b>Pumping Nominal Flow Rate</b> : ℓ/sec</p> <p><b>Pumping Head</b> : m</p>					5 Projects and More	15	
	Signature (of person authorised to sign on behalf of the tenderer) : ..... Date:.....							
						Possible Ful Points =	<b>15</b>	
						Actual Points Obtained <b>D2</b> =		



**Clients Name** : .....

**Name of Project:** : .....

**Pumping Nominal Flow Rate** : .....l/sec

**Pumping Head** : .....m



CLIENTS OFFICIAL STAMP

.....  
SIGNATURE(S) OF CLIENTS REPRESENTATIVE

**Signatures of the respective client to be added on this form for each project. Where there is more than one project, this form should be duplicated for the respective number of projects used.**

**FORM D 3: Schedule of Work Carried out by the Tenderer**

The Tenderer shall list below all civil engineering contracts of Water projects. This information is material to the award of the Contract. List here Tenderer's experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)

D3	List below works undertaken for each discipline/category as main contractor <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D3 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	No Projects					0 Projects	0	
	Name of Project 1 : Diameter of Pipeline : m Length of pipeline : m Pipe Material (PVC, Steel) :					1 Projects	3	
	Name of Project 2 : Diameter of Pipeline : m Length of pipeline : m Pipe Material (PVC, Steel) :					2 Projects	6	
Signature (of person authorised to sign on behalf of the tenderer) : ..... Date:.....								

D3	List below works undertaken for each discipline/category as main contractor A <b>SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D3 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	<b>Name of Project 3</b> : <b>Diameter of Pipeline</b> : m <b>Length of pipeline</b> : m <b>Pipe Material (PVC, Steel)</b> :					3 Projects	9	
	<b>Name of Project 4</b> : <b>Diameter of Pipeline</b> : m <b>Length of pipeline</b> : m <b>Pipe Material (PVC, Steel)</b> :					4 Projects	12	
Signature (of person authorised to sign on behalf of the tenderer) : ..... Date:.....								

D3	List below works undertaken for each discipline/category as main contractor A <b>SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D3 BY THE RESPECTIVE CLIENT FOR THE RESPECTIVE PROJECTS MUST BE INCLUDED IN THE TENDER SUBMISSION IN ORDER TO CLAIM POINTS. Along with a detailed description as provided on the forms below.</b>					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
		Project Value	Contact Name	Client Organisation	Tel N°			
Experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	<p><b>Name of Project</b> 5 :</p> <p><b>Diameter of Pipeline</b> : m</p> <p><b>Length of pipeline</b> : m</p> <p><b>Pipe Material (PVC, Steel)</b> :</p>					5 Projects and More	15	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	<b>15</b>	
						Actual Points Obtained <b>D3</b> =		

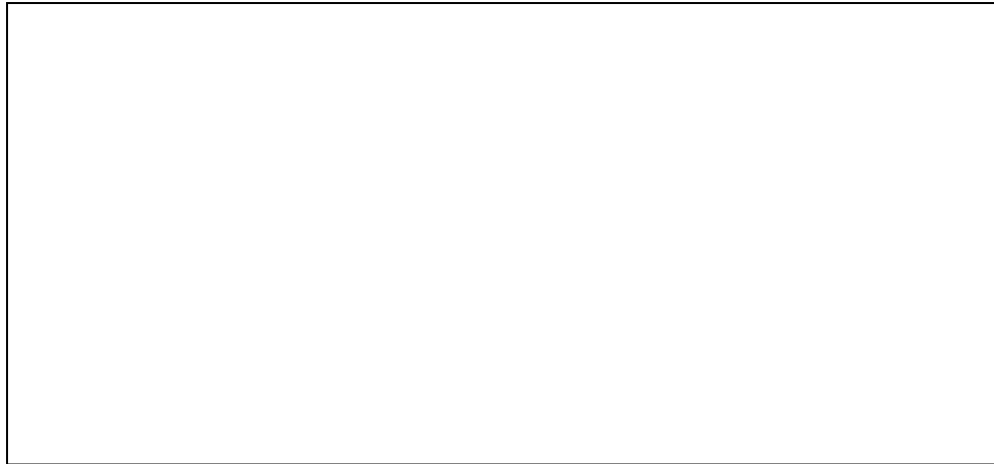
Clients Name : .....

Name of Project: : .....

Diameter of Pipeline : .....m

Length of pipeline : .....m

Pipe Material (PVC, Steel) : .....



CLIENTS OFFICIAL STAMP

.....  
SIGNATURE(S) OF CLIENTS REPRESENTATIVE

**Signatures of the respective client to be added on this form for each project. Where there is more than one project, this form should be duplicated for the respective number of projects used.**

**FORM E: Preliminary Programme**

The Tenderer shall detail below or attach a preliminary programme reflecting the proposed sequence and tempo of execution of the various activities comprising the work for this Contract. The programme shall be in accordance with the information supplied in the Contract, requirements of the Project Specifications and with all other aspects of his Tender.

**PROGRAMME**

ACTIVITY	WEEKS													

*[Note: The programme must be based on the completion time as specified in the Contract Data. No other completion time that may be indicated on this programme will be regarded as an alternative offer, unless it is listed in Table (b) of Form F hereafter and supported by a detailed statement to that effect, all as specified in the Tender Data]*

SIGNATURE: .....  
(of person authorised to sign on behalf of the Tenderer)

DATE: .....

**FORM F: Amendments, Qualifications and Alternatives**

(This is not an invitation for amendments, deviations or alternatives but should the Tenderer desire to make any departures from the provisions of this contract he shall set out his proposals clearly hereunder. The Employer will not consider any amendment, alternative offers or discounts unless forms (a), (b) and (c) have been completed to the satisfaction of the Employer).

I / We herewith propose the amendments, alternatives and discounts as set out in the tables below:

**(a) AMENDMENTS**

PAGE, CLAUSE OR ITEM NO	PROPOSED AMENDMENT

Notes:

- (1) Proposals for amendments to the General and Special Conditions of Contract are not acceptable, and will be ignored;
- (2) The Tenderer must give full details of all the financial implications of the amendments and qualifications in a covering letter attached to his tender.

**(b) ALTERNATIVES**

PROPOSED ALTERNATIVE	DESCRIPTION OF ALTERNATIVE

Notes

- (1) Individual alternative items that do not justify an alternative tender, and an alternative offer for time for completion should be listed here.
- (2) In the case of a major alternative to any part of the work, a separate Bill of Quantities, programme, etc, and a detailed statement setting out the salient features of the proposed alternatives must accompany the tender.
- (3) Alternative tenders involving technical modifications to the design of the works and methods of construction shall be treated separately from the main tender offer.

**(c) DISCOUNTS**

ITEM ON WHICH DISCOUNT IS OFFERED	DESCRIPTION OF DISCOUNT OFFERED

Note

The Tenderer must give full details of the discounts offered in a covering letter attached to his tender, failing which, the offer for a discount may have to be disregarded.

SIGNATURE: ..... DATE: .....  
(of person authorised to sign on behalf of the Tenderer)



**FORM G: SARS PIN**

The Tenderer is to attach valid SARS Pin on this page. In the case of a Joint Venture, valid copies of SARS Pin for all members of the Joint Venture must be attach.

**FORM H: Tenderer's Financial Standing**

**CREIGHTON BULK WATER SUPPLY SCHEME**

**CONTRACT No. HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

The Employer may make inquiries to verify the submitted bank rating from the Tenderer's bank.

To this end, the Tenderer must provide with his tender, a bank stamped rating, certified by his banker, to the effect that he will be able to successfully complete the contract at the tendered amount within the specified time for completion.

However, should the tenderer be unable to provide a bank rating with his tender, he shall be state the reasons thereof and in addition provide the following details of his banker and bank account details that he intends to use for the contract:

Name of Account Holder: .....

Name of Bank: ..... Branch: .....

Account Number: ..... Account Type: .....

Telephone Number: ..... Fax N<sup>o</sup>: .....

Name of Contact Person (*at bank*): .....

Failure to provide either the required bank details or a certified bank stamped rating with his tender will lead to the conclusion that the Tenderer does not have the necessary financial resources at his disposal to complete the contract successfully within the specified time for completion.

The Employer undertakes to treat the information thus received as confidential, strictly for the use of evaluation of the tender submitted by the Tenderer.

SIGNATURE: .....  
(*of person authorised to sign on behalf of the Tenderer*)

DATE: .....

**BANK RATING**

*Tenderers to attach a Bank Stamped Rating to this page. Failure to comply may lead to awarding of zero points for quality on this criterion.*

H	Score one of the ratings listed below as reflected on rating received	Points	Score (S)
	Bank Rating A – Undoubted for the amount of enquiry	20	
	Bank Rating B – Good for the amount of enquiry	16	
	Bank Rating C – Average to Good for the amount quoted if applied strictly in the way of business	12	
	Bank Rating D to F – Rating below good (D)	8	
	Bank Rating below F and non-complying	0	
		<b>Possible Full Points = 20</b>	
		<b>Actual Points Obtained H =</b>	

**FORM I: Form of Intent to Provide a Performance Guarantee**

*[The Tenderer must attach hereto a letter from the bank or institution. with whom he has made the necessary arrangements, to the effect that the said bank or institution will be prepared to provide the required performance guarantee when asked to do so].*

*Tenderers are to refer to Form C1.3: Form of Guarantee*

**FORM J : Compulsory Enterprise Questionnaire**

The following particulars must be furnished. In the case of a joint venture, **separate** enterprise questionnaires in respect of each partner must be completed and submitted.

**Section 1: Name of enterprise:** .....

**Section 2: VAT registration number, if any:** .....

**Section 3: CIDB registration number, if any:** .....

**Section 4: Particulars of sole proprietors and partners in partnerships**

Name*	Identity number*	Personal income tax number*

\* Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

**Section 5: Particulars of companies and close corporations**

Company registration number .....

Close corporation number .....

Tax reference number .....

**Section 6: Record of service of the state**

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"/> 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"/> a member of any provincial legislature                                | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity  |
| <input type="checkbox"/> a member of the National Assembly or the National Council of Province | <input type="checkbox"/> an employee of Parliament or a provincial legislature  |
| <input type="checkbox"/> a member of the board of directors of any municipal entity            |   |
| <input type="checkbox"/> an official of any municipality or municipal entity                   |   |

**If any of the above boxes are marked, disclose the following:**

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 months

\*insert separate page if necessary

**Section 7: Record of spouses, children, and parents in the service of the state**

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 been in the service of any of the following:

- a member of any municipal council
- a member of any provincial legislature
- a member of the National Assembly or the National Council of Province
- a member of the board of directors of any municipal entity
- an official of any municipality or municipal entity
- 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)
- a member of an accounting authority of any national or provincial public entity
- 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 months

\*insert separate page if necessary

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

- i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are 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;
- iv) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct;

Signed \_\_\_\_\_ Date \_\_\_\_\_  
 Name \_\_\_\_\_ Position \_\_\_\_\_  
 Name of Enterprise \_\_\_\_\_

## **FORM K: Proof of Purchase of Tender Documents**

The Tenderer shall insert here proof of purchase of the tender documents in the form of an official receipt or other acceptable form of proof

**FORM L1: MBD2 Form (Tax clearance certificate requirements)**

1

**A) TAX CLEARANCE CERTIFICATE REQUIREMENTS**

It is a condition of a bid that the taxes of the successful bidder **must** be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the supplier's tax obligations.

1. In order to meet this requirement, suppliers are required to complete in full the attached form TCC 001 "Application for a Tax Certificate" and submit it to any SARS branch office nationally. The Tax Clearance Certificate Requirements are also applicable to foreign bidders/individuals who wish to submit bids.
2. SARS will then furnish the suppliers with a Tax Clearance Certificate that will be valid for a period of 1 (one) year from the date of approval. Copies of TCC 001 "Application for a Tax Clearance Certificate" form are available from any SARS branch office nationally or on the website [www.sars.gov.za](http://www.sars.gov.za).
3. The original Tax Clearance Certificate or SARS PIN must be submitted together with the bid. Failure to submit the original and valid Tax Clearance Certificate will result in the invalidation of the bid. Certified copies of the Tax Clearance Certificate will not be acceptable.
4. In Bids where Consortia/Joint Ventures/Sub-suppliers are involved, each party must submit a separate Tax Clearance Certificate.
5. Applications for the Tax Clearance Certificates may also be made via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website [www.sars.gov.za](http://www.sars.gov.za)



**FORM L2: MBD4 FORM (TAX CLEARANCE CERTIFICATE REQUIREMENTS)**

**MBD 4**

**DECLARATION OF INTEREST**

- 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.
- 3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Full Name of bidder or his or her representative:.....

3.2 Identity Number: .....

3.3 Position occupied in the Company (director, trustee, hareholder<sup>2</sup>):.....

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, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? **YES / NO**

3.8.1 If yes, furnish particulars. ....

.....

<sup>1</sup>MSCM Regulations: "in the service of the state" means to be –

- (a) a member of –
  - (i) any municipal council;
  - (ii) any provincial legislature; or
  - (iii) the national Assembly or the national Council of provinces;
- (b) a member of the board of directors of any municipal entity;
- (c) an official of any municipality or municipal entity;
- (d) an employee of any national or provincial department, national or provincial public entity 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 entity; or
- (f) an employee of Parliament or a provincial legislature.

<sup>2</sup> 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.

3.9 Have you been in the service of the state for the past twelve months? ..... **YES / NO**

3.9.1 If yes, furnish particulars.....

.....

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**

3.10.1 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**

3.11.1 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**

3.12.1 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**

3.13.1 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**

3.14.1 If yes, furnish particulars:

.....  
 .....

4. Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	State Employee Number


.....  
**Signature**

.....  
**Date**

.....  
**Capacity**

.....  
**Name of Bidder**

.....

**FORM L3: MBD5 FORM (DECLARATION FOR PROCUREMENT ABOVE R10 MILLION)**

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:

1 Are you by law required to prepare annual financial statements for auditing?

YES / NO

1.1 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.

.....  
.....

2 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?

YES / NO

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.

2.2 If yes, provide particulars.

.....  
.....  
.....

3 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?

YES / NO

3.1 If yes, furnish particulars

.....  
.....

4 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?

YES / NO

4.1 If yes, furnish particulars

.....  
.....

**CERTIFICATION**

**I, THE UNDERSIGNED (NAME) .....  
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT. I  
ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE  
FALSE.**

.....  
Signature

.....  
Date

.....  
Position

.....  
Name of Bidder

**FORM L4: MBD6.1 FORM (PREFERENTIAL PROCUREMENT)**

**PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022**

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. 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); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

**1.2 To be completed by the organ of state**

*(delete whichever is not applicable for this tender).*

- a) The applicable preference point system for this tender is the 90/10 preference point system.
- b) The 90/10 preference point system will be applicable in this tender. The lowest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

- (a) Price; and
- (b) Specific Goals.

**1.4 To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	
SPECIFIC GOALS	
Total points for Price and SPECIFIC GOALS	100

1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.6 The organ of state 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 to preferences, in any manner required

by the organ of state.

## 2. DEFINITIONS

- a) **“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;
- b) **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- c) **“rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state 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 organ of state and a third party that produces revenue for the organ of state, 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; and
- e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

## 3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

### 3.1. POINTS AWARDED FOR PRICE

#### 3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

$$Ps = 80 \left( 1 - \frac{Pt - Pmin}{Pmin} \right) \quad \text{or} \quad Ps = 90 \left( 1 - \frac{Pt - Pmin}{Pmin} \right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

### 3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

#### 3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

$$Ps = 80 \left( 1 + \frac{Pt - Pmax}{Pmax} \right) \quad \text{or} \quad Ps = 90 \left( 1 + \frac{Pt - Pmax}{Pmax} \right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

Description	Maximum Allocated Points
Tender's Experience on Similar Projects	50
Tender's Financial Standing	20
Key Personnel	20
Quality Management System	10
<b>TOTAL MAXIMUM POINTS</b>	<b>100</b>

Returnable Schedule	Criteria			Total Weighting %	Verification Method
Form D1	Tenderer's Experience In construction of 3MI Water Treatment Works or Higher capacity	<b>No of Projects completed</b>	<b>Points</b>	25	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D1 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		0 Projects	0		
		1 Project	5		
		2 Projects	10		
		3 Projects	15		
		4 Projects	20		
5 Projects and More	25				
Form D2	Tenderer's experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework's, mechanic works and electrical works	No of Projects completed		15	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D2 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		0 Projects	0		
		1 Project	3		
		2 Projects	6		
		3 Projects	9		
		4 Projects	12		
5 Projects and More	15				
Form D3	Tenderer's experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	No of Projects completed		10	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D3 must be used as a template to generate the reference letter, the reference letter should be placed on a letter head, signed, and stamped by the accounting officer or technical head from the client on which the project was executed for.</b> NB: All above information is required for each project claimed.
		0 Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
5 Projects and More	10				
Form H	Financial Resources	Undoubted for your enquiry	A = 20	20	Rating by bank where account is held (Originally Stamped by Bank not older than 3 months), attached to <b>Form H</b> .
		Good for tender amount quoted	B = 15		
		Average to good for the amount of tender enquiry, if strictly in the way of business	C = 10		
		Rating below good (D)	D-F = 5		
		Rating below F and non-complying	= 0		
		<b>Key Personnel</b>	<b>Points</b>		



Returnable Schedule	Criteria		Total Weighting %	Verification Method	
Form S	Experience of Key Personnel (Contracts Manager)	Approved Degree/Diploma in the built environment (civil engineering) qualification and experience in the position		6	Curricula Vitae to be attached to <b>FORM S</b> Key Personnel.  An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.  An originally certified (not copy of certified copy) copy of the relevant Degree or Diploma in Civil Engineering.
		Relevant Professional Registration with ECSA or SACPCMP with 1-4 years of appropriate experience	2		
		Relevant Professional Registration with ECSA or SACPCMP with 5-7 years of appropriate experience	4		Curricula Vitae to be attached to <b>FORM S</b> Key Personnel. Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>
		Relevant Professional Registration with ECSA or SACPCMP with 8 and above years of appropriate experience	6		
		No qualification with relevant experience in the position			
		Between 0 - 3 years' relevant experience in the position	0		
		Between 4 - 6 years' relevant experience in the position	1		
		Between 7 - 9 years' relevant experience in the position.	2		
		10 and above years' relevant experience in the position	3		
		<b>Key Personnel</b>	<b>Points</b>		
	Experience of Key Personnel (Site Agent)	Approved Degree/Diploma in the built environment (civil engineering) qualification and experience in the position		7	Curricula Vitae to be attached to <b>FORM S</b> : Key Personnel.  An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.  An originally certified copy (not copy of certified copy) of the relevant Degree or Diploma in Civil Engineering.  Curricula Vitae to be attached to <b>FORM S</b> Key Personnel. Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>
		Relevant Professional Registration with ECSA or SACPCMP with 1-4 years of appropriate experience	2		
		Relevant Professional Registration with ECSA or SACPCMP with 5-7 years of appropriate experience	4		
		Relevant Professional Registration with ECSA or SACPCMP with 8 and above years of appropriate experience	7		
		No qualification with relevant experience in the position			
		Between 0 - 3 years' relevant experience in the position	0		
		Between 4 - 6 years' relevant experience in the position	1		
		Between 7 - 9 years' relevant experience in the position.	2		
		10 and above years' relevant experience in the position	3		
		<b>Key Personnel</b>	<b>Points</b>		
	Experience of	1 - 3 years' experience in	1		Curricula Vitae to be attached to <b>FORM S</b> Key Personnel.

	Key Personnel (Foreman)	the position		7	Experience must be only on civil engineering projects specifically water.  <b>Note: All references provided on CV's must be traceable, valid, and aligned to the project being claimed for, failure to abide by this will result in the personal being disregarded.</b>
		4 - 6 years' experience in the position	3		
		7 - 9 years' experience in the position	5		
		10 and above years' experience in the position	7		
Form X	Quality Assurance Plan and Control Procedures	<b>Score Status</b>	<b>Points</b>	10	
		Have ISO 9001 Accreditation	10		If selected, attach current copy of ISO Accreditation Certificates to <b>Form X</b> .
		Have Own Internal QA Plan	6		If selected, attach copy of Internal Quality Assurance Plan to <b>Form X</b> .
		None	0		
FORM Z	<b>Total Possible Points</b>		<b>100</b>		

**Tenderers that score less than 65% of the total score allowed for quality will not be considered further.**

**4. 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 goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this 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 points claimed are indicated per the table below.**

***(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.***

***Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)***

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)

Points will be awarded to Tenderers for attaining the Specific Goal of contribution as per the preferential procurement policy framework Act, 2000: preferential procurement regulations, 2022 as detailed below. The table below was derived from preference goal 3 which is a combination of preference goals 1 and 2.

	<b>90/10</b>	<b>Verification Method</b>
Black Ownership ≥ 51 %	5	ID Copies of directors, Company registration, CSD Report and shareholder certificates
Less than 51 % owned by black people	3	ID Copies of directors, Company registration, CSD Report and shareholder certificates
Locality (Enterprise that is located within the KZN Province, location to be determined by the address registered on the CSD).	5	CSD Report
Locality (Enterprise that is not located within the KZN Province, Location to be determined by the address registered on the CSD)	3	CSD Report
<b>TOTAL</b>	<b>10</b>	

**DECLARATION WITH REGARD TO COMPANY/FIRM**

4.3. Name of company/firm.....

4.4. Company registration number: .....

4.5. TYPE OF COMPANY/ FIRM

- Partnership/Joint Venture / Consortium
- One-person business/sole propriety

- Close corporation
  - Public Company
  - Personal Liability Company
  - (Pty) Limited
  - Non-Profit Company
  - State Owned Company
- [TICK APPLICABLE BOX]

4.6. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- iii) 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;
- iv) 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.

..... <b>SIGNATURE(S) OF TENDERER(S)</b>	
<b>SURNAME AND NAME:</b>	.....
<b>DATE:</b>	.....
<b>ADDRESS:</b>	.....
	.....
	.....
	.....

**FORM M1: MBD7.1 FORM (CONTRACT FORM – PURCHASE OF GOODS/WORKS)**

**CONTRACT FORM - PURCHASE OF GOODS/WORKS**

**THIS FORM MUST BE FILLED IN DUPLICATE BY BOTH THE SUCCESSFUL BIDDER (PART 1) AND THE PURCHASER (PART 2). BOTH FORMS MUST BE SIGNED IN THE ORIGINAL SO THAT THE SUCCESSFUL BIDDER AND THE PURCHASER WOULD BE IN POSSESSION OF ORIGINALLY SIGNED CONTRACTS FOR THEIR RESPECTIVE RECORDS.**

**PART 1 (TO BE FILLED IN BY THE BIDDER)**

I hereby undertake to supply all or any of the goods and/or works described in the attached bidding documents to (name of institution)..... in accordance with the requirements and specifications stipulated in bid number..... at the price/s quoted. My offer/s remain binding upon me and open for acceptance by the purchaser during the validity period indicated and calculated from the closing time of bid.

1. The following documents shall be deemed to form and be read and construed as part of this agreement:
  - (i) Bidding documents, viz
    - Invitation to bid;
    - Tax clearance certificate;
    - Pricing schedule(s);
    - Technical Specification(s);
    - Preference claims for Broad Based Black Economic Empowerment Status Level of Contribution in terms of the Preferential Procurement Regulations 2011;
    - Declaration of interest;
    - Declaration of bidder’s past SCM practices;
    - Certificate of Independent Bid Determination;
    - Special Conditions of Contract;
  - (ii) General Conditions of Contract; and
  - (iii) Other (specify)
2. I confirm that I have satisfied myself as to the correctness and validity of my bid; that the price(s) and rate(s) quoted cover all the goods and/or works specified in the bidding documents; that the price(s) and rate(s) cover all my obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.
3. I accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this agreement as the principal liable for the due fulfillment of this contract.
4. I declare that I have no participation in any collusive practices with any bidder or any other person regarding this or any other bid.
5. I confirm that I am duly authorised to sign this contract.

NAME (PRINT) .....

CAPACITY .....

SIGNATURE .....

NAME OF FIRM .....

DATE .....

<b>WITNESSES</b>	
1	.....
2.	.....
DATE:.....	

**CONTRACT FORM - PURCHASE OF GOODS/WORKS**

**PART 2 (TO BE FILLED IN BY THE PURCHASER)**

1. I..... in my capacity as..... accept your bid under reference number .....dated.....for the supply of goods/works indicated hereunder and/or further specified in the annexure(s).
2. An official order indicating delivery instructions is forthcoming.
3. I undertake to make payment for the goods/works delivered in accordance with the terms and conditions of the contract, within 30 (thirty) days after receipt of an invoice accompanied by the delivery note.

ITEM NO.	PRICE (ALL APPLICABLE TAXES INCLUDED)	BRAND	DELIVERY PERIOD	B-BBEE STATUS LEVEL OF CONTRIBUTION	MINIMUM THRESHOLD FOR LOCAL PRODUCTION AND CONTENT (if applicable)

4  
 . I confirm that I am duly authorized to sign this contract.

SIGNED AT .....ON.....

NAME (PRINT) .....

SIGNATURE .....

OFFICIAL STAMP

WITNESSES

1. ....

2. ....

DATE .....

**FORM M2: MBD7.2 FORM (CONTRACT FORM – RENDERING OF SERVICES)**

**CONTRACT FORM - RENDERING OF SERVICES**

**THIS FORM MUST BE FILLED IN DUPLICATE BY BOTH THE SERVICE PROVIDER (PART 1) AND THE PURCHASER (PART 2). BOTH FORMS MUST BE SIGNED IN THE ORIGINAL SO THAT THE SERVICE PROVIDER AND THE PURCHASER WOULD BE IN POSSESSION OF ORIGINALLY SIGNED CONTRACTS FOR THEIR RESPECTIVE RECORDS.**

**PART 1 (TO BE FILLED IN BY THE SERVICE PROVIDER)**

1. I hereby undertake to render services described in the attached bidding documents to (name of the institution)..... in accordance with the requirements and task directives / proposals specifications stipulated in Bid Number..... at the price/s quoted. My offer/s remain binding upon me and open for acceptance by the Purchaser during the validity period indicated and calculated from the closing date of the bid.

2. The following documents shall be deemed to form and be read and construed as part of this agreement:

(i) Bidding documents, viz

- Invitation to bid;
- Tax clearance certificate/ SARS Pin;
- Pricing schedule(s);
- Filled in task directive/proposal;
- Preference claims for Specific Goal Status Level of Contribution in terms of the Preferential Procurement Regulations 2022;
- Declaration of interest;
- Declaration of Bidder’s past SCM practices;
- Certificate of Independent Bid Determination;
- Special Conditions of Contract;

(ii) General Conditions of Contract; and

(iii) Other (specify)

3. I confirm that I have satisfied myself as to the correctness and validity of my bid; that the price(s) and rate(s) quoted cover all the services specified in the bidding documents; that the price(s) and rate(s) cover all my obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.

4. I accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this agreement as the principal liable for the due fulfillment of this contract.

5. I declare that I have no participation in any collusive practices with any bidder or any other person regarding this or any other bid.

6. I confirm that I am duly authorised to sign this contract.

NAME (PRINT) .....

CAPACITY .....

SIGNATURE .....

NAME OF FIRM .....

DATE .....

<b>WITNESSES</b>	
1	.....
2	.....
DATE:	.....

**CONTRACT FORM - RENDERING OF SERVICES**

**PART 2 (TO BE FILLED IN BY THE PURCHASER)**

1. I..... in my capacity as..... accept your bid under reference number .....dated.....for the rendering of services indicated hereunder and/or further specified in the annexure(s).
2. An official order indicating service delivery instructions is forthcoming.
3. I undertake to make payment for the services rendered in accordance with the terms and conditions of the contract, within 30 (thirty) days after receipt of an invoice.

DESCRIPTION OF SERVICE	PRICE (ALL APPLICABLE TAXES INCLUDED)	COMPLETION DATE	B-BBEE STATUS OF CONTRIBUTION	MINIMUM THRESHOLD FOR LOCAL PRODUCTION AND CONTENT (if applicable)

I confirm that I am duly authorised to sign this contract.

SIGNED AT ..... ON .....

NAME (PRINT) .....

SIGNATURE .....

OFFICIAL STAMP

**WITNESSES**

1.....

2.....

**DATE:**

.....



**FORM N1: MBD8 FORM (DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES)****DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES**

- 1 This Standard Bidding Document must form part of all bids invited.
- 2 It serves as a declaration to be used by institutions 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 The bid of any bidder may be disregarded if that bidder, or any of its directors have-
  - a. abused the institution's supply chain management system
  - b. committed fraud or any other improper conduct in relation to such system; or
  - c. failed to perform on any previous contract.
- 4 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
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 <i>audi altera parte</i> rule was applied).  <b>The Database of Restricted Suppliers now resides on the National Treasury's website (<a href="http://www.treasury.gov.za">www.treasury.gov.za</a>) and can be accessed by clicking on its link at the bottom of the home page.</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4.1.1	If so, furnish 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)?  <b>Register for Tender Defaulters can be accessed on the National Treasury's website (<a href="http://www.treasury.gov.za">www.treasury.gov.za</a>) by clicking on its link at the bottom of the home page.</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4.4.1	If so, furnish particulars:		

**CERTIFICATION**

I, THE UNDERSIGNED (FULL NAME).....

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS 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.

.....

**Signature**

.....

**Position**

.....

**Date**

.....

**Name of Bidder**

## FORM N2: MBD9 FORM (CERTIFICATE OF INDEPENDENT BID DETERMINATION)

### CERTIFICATE OF INDEPENDENT BID DETERMINATION

- 1 This Municipal Bidding Document (MBD) must form part of all bids<sup>1</sup> invited.
- 2 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 Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:
  - a. disregard the bid of any bidder if that bidder, or any of its directors have abused the institution's supply chain management system and or committed fraud or any other improper conduct in relation to such system.
  - b. cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.
- 4 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 In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

<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.

### 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 Institution)

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

I certify, on behalf of: \_\_\_\_\_ that:

(Name of Bidder)

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; and
  - (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; or
  - (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.

<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.

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.

.....  
Signature

.....  
Date

.....  
Position

.....  
Name of Bidder

**FORM O: Joint Venture Disclosure Form**

**EMPLOYER** : Harry Gwala District Municipality  
**CONTRACT DESCRIPTION** : CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY  
**CONTRACT NUMBER** : HGDM821/HGDM/2022  
**PROJECT REFERENCE NUMBER** :

- Note:
- 1) This form needs not be completed for Joint Ventures which have targeted enterprise partners.
  - 2) All the information requested must be filled in the spaces provided. If additional space is required, additional sheets may be attached.
  - 3) A copy of the joint venture agreement must be attached to this form. In order to demonstrate the targeted enterprise partner's share in the ownership, control, management responsibilities, risks and profits of the joint venture, the proposed joint venture agreement must include specific details relating to:
    - i) The contributions of capital and equipment
    - ii) Work items to be performed by the targeted enterprise partner's own forces.
    - iii) Work items to be performed under the supervision of the targeted enterprise partner.
    - iv) The commitment of management, supervisory and operative personnel employed by the targeted enterprise partner to be dedicated to the performance of the Contract.
  - 4) Copies of all written agreements between partners concerning the contract must be attached to this form including those which relate to ownership options and to restrictions/limits regarding ownership and control.
  - 5) Targeted enterprise partners must each complete an Enterprise Declaration Affidavits.

**JOINT VENTURE PARTICULARS**

Name : \_\_\_\_\_  
Postal address : \_\_\_\_\_  
Physical address : \_\_\_\_\_  
Telephone : \_\_\_\_\_ Fax \_\_\_\_\_

**IDENTITY OF EACH NON-TARGETED ENTERPRISE PARTNERS**

Name : \_\_\_\_\_  
Postal address : \_\_\_\_\_  
Physical address : \_\_\_\_\_  
Telephone : \_\_\_\_\_ Fax \_\_\_\_\_  
Contact Person : \_\_\_\_\_

(Continue as required for further non-targeted enterprise partners)

Name : \_\_\_\_\_  
Postal address : \_\_\_\_\_  
Physical address : \_\_\_\_\_  
Telephone : \_\_\_\_\_ Fax \_\_\_\_\_

Contact Person : .....

**IDENTITY OF EACH TARGETED ENTERPRISE PARTNER**

Name : \_\_\_\_\_  
 Postal address : \_\_\_\_\_  
 Physical address : \_\_\_\_\_  
 Telephone : \_\_\_\_\_ Fax : \_\_\_\_\_  
 Contact Person : .....

Name : \_\_\_\_\_  
 Postal address : \_\_\_\_\_  
 Physical address : \_\_\_\_\_  
 Telephone : \_\_\_\_\_ Fax : \_\_\_\_\_  
 Contact Person : .....

Name : \_\_\_\_\_  
 Postal address : \_\_\_\_\_  
 Physical address : \_\_\_\_\_  
 Telephone : \_\_\_\_\_ Fax : \_\_\_\_\_  
 Contact Person : .....

**DESCRIPTION OF THE ROLE OF THE TARGETED PARTNERS IN THE JOINT VENTURE**


**OWNERSHIP OF THE JOINT VENTURE**

a) Percentage Ownership in respect of	:	Targeted Enterprises	:	%	Targeted Enterprises	:	%
b) Profit and Loss Sharing	:	Targeted Enterprises	:	%	Targeted Enterprises	:	%
c) Initial Capital Contribution	:	Targeted Enterprises	:	R	Targeted Enterprises	:	R
d) Ongoing Capital Contribution	:	Targeted Enterprises	:	R	Targeted Enterprises	:	R
e) Major Plant and Equipment Contribution	:	Targeted Enterprises	:		Targeted Enterprises	:	

**RECENT CONTRACTS EXECUTED BY PARTNERS IN THEIR OWN RIGHT OR AS PARTNERS IN OTHER JOINT VENTURES**

**Targeted Enterprise Partners**

1. : .....
2. : .....
3. : .....

4. : \_\_\_\_\_  
 5. : \_\_\_\_\_

**Non-Targeted Enterprise Partners**

1. : \_\_\_\_\_  
 2. : \_\_\_\_\_  
 3. : \_\_\_\_\_  
 4. : \_\_\_\_\_  
 5. : \_\_\_\_\_

**CONTROL AND PARTICIPATION IN THE JOINT VENTURE**

(Identify by name and firm those individuals who are, or will be, responsible for, and have authority to engage in the relevant management functions and policy and decision making, indicating any limitations in their authority e.g. co-signature requirements and Rand limits).

Function	Targeted Enterprise Partner		Non-Targeted Enterprise	
	Enterprise	Name of Person	Enterprise	Name of Person
Cheque Signing				
Authority to enter into contracts on behalf of the Joint Venture				
Signing, co-signing and/or collateralizing of loans				
Acquisition of lines of credit				
Acquisition of performance bonds				
Negotiating and signing labour agreements				



**MANAGEMENT OF CONTRACT PERFORMANCE**

(Fill in the name and firm of the responsible person).

Function	Targeted Enterprise Partner		Non-Targeted Enterprise	
	Enterprise	Name of Person	Enterprise	Name of Person
Supervision of field operations				
Major purchasing				
Estimating				
Technical management				

**MANAGEMENT AND CONTROL OF JOINT VENTURE**

- a) Managing Partner : \_\_\_\_\_
- b) What authority does each partner have to commit or obligate the other to financial institutions, insurance companies, suppliers, subcontractors and /or other parties participating in the execution of the contemplated works?

Partner	Targeted Enterprise Status		Authority Status	
	YES	NO	YES	NO

**PERSONNEL**

a. State the approximate number of operative personnel (by trade/ function/ discipline) needed to perform the Joint Venture work under the contract.

TRADE/FUNCTION/	Total Qty Required	Qty supplied by Targeted Enterprise	Qty supplied by non-Targeted Enterprise

- b) Name of individual who will be responsible for hiring Joint Venture employees : \_\_\_\_\_
- c) Name of individual who will be responsible for preparation of Joint venture payrolls : \_\_\_\_\_

**CONTROL AND STRUCTURE OF THE JOINT VENTURE**

Briefly describe the manner in which the Joint Venture is structured and controlled.


The undersigned warrants that he/she is duly authorized to sign this Joint Venture Disclosure Form and affirms that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operations of the Joint Venture and the intended participation of each partner in the undertaking.

The undersigned further covenants and agrees to provide the Employer with complete and accurate information regarding actual Joint Venture work and the payment therefore, and any proposed changes in any provisions of the Joint Venture agreement, and to permit the audit and examination of the books, records, and files of the Joint Venture, or those of each partner relevant to the Joint Venture, by duly authorized representatives of the Employer.

Signature : \_\_\_\_\_  
Name : \_\_\_\_\_  
Duly authorised to sign on behalf of : \_\_\_\_\_  
Address : \_\_\_\_\_  
Telephone : \_\_\_\_\_  
Fax : \_\_\_\_\_  
Date : \_\_\_\_\_

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT No. HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**PART T2.2: RETURNABLE DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT**

**INDEX**

<b>FORM P:</b>	<b>Schedule of Construction Plant &amp; Equipment .....</b>	<b>58</b>
<b>FORM Q:</b>	<b>Schedule of Proposed Sub-Contractors.....</b>	<b>59</b>
<b>FORM R:</b>	<b>Record of Addenda to Tender Documents .....</b>	<b>60</b>
<b>FORM S:</b>	<b>Key Personnel .....</b>	<b>61</b>
<b>FORM T:</b>	<b>Rates for Special Materials .....</b>	<b>63</b>
<b>FORM U:</b>	<b>Contractor's Health and Safety Declaration .....</b>	<b>64</b>
<b>FORM V:</b>	<b>UIF Registration Certificate .....</b>	<b>66</b>
<b>FORM W:</b>	<b>Certificate of Municipal Services.....</b>	<b>67</b>
<b>FORM X:</b>	<b>Quality Management System (Quality Assurance Plan &amp; Control .....</b>	<b>69</b>
<b>FORM Y:</b>	<b>Supply Chain Management Policy.....</b>	<b>70</b>
<b>FORM Z:</b>	<b>Total Score (Functionality).....</b>	<b>72</b>

**FORM P: Schedule of Construction Plant & Equipment**

The following are lists of major Construction Plant and Equipment that I / We presently own or Lease and will have available for this contract if my / our tender is accepted. Tenderer shall submit a certificate of ownership / title / registration document to prove ownership.

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

DESCRIPTION ( <i>type, size, capacity etc</i> )	QUANTITY	YEAR OF MANUFACTURE

*Attach additional pages if more space is required*

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

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

*Attach additional pages if more space is required*

SIGNATURE: .....  
 (of person authorised to sign on behalf of the Tenderer)

DATE: .....

**FORM Q: Schedule of Proposed Sub-Contractors**

I/We hereby notify you that it is my/our intention to employ the following Sub-Contractors for work in this contract.

NAMES AND ADDRESSES OF PROPOSED SUBCONTRACTORS	NATURE AND EXTENT OF WORK TO BE SUBCONTRACTED	PREVIOUS EXPERIENCE WITH SUBCONTRACTOR OR RECENT WORK EXECUTED BY THE SUB-CONTRACTOR

**SIGNATURE:** .....  
*(of person authorised to sign on behalf of the Tenderer)*

**DATE:** .....

**FORM R: Record of Addenda to Tender Documents**

We confirm that the following communications received from the Engineer before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer:

	Date	Title or Details
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Attach additional pages if more space is required.

Signed: ..... Date: .....

Name: ..... Position: .....

SIGNATURE: ..... DATE: .....  
*(of person authorised to sign on behalf of the Tenderer)*

**FORM S: Key Personnel**

Tenderers shall provide details of the Site Agent(s) and General Foreman’s experience in work of a similar nature to that for which their tender is submitted.

Failure to complete this schedule may result in the tender not being considered.

a. Contracts Manager

<b>CONTRACTS MANAGER</b>	<b>NAME:.....</b>			
<b>CONTRACT &amp; CLIENT</b>	<b>NATURE OF WORK</b>	<b>POSITION HELD</b>	<b>VALUE OF WORK</b>	<b>YEAR COMPLETED</b>

b. Site Agent

<b>SITE AGENT</b>	<b>NAME:.....</b>			
<b>CONTRACT &amp; CLIENT</b>	<b>NATURE OF WORK</b>	<b>POSITION HELD</b>	<b>VALUE OF WORK</b>	<b>YEAR COMPLETED</b>

c. Foreman

<b>GENERAL FOREMAN</b>	<b>NAME:.....</b>			
<b>CONTRACT &amp; CLIENT</b>	<b>NATURE OF WORK</b>	<b>POSITION HELD</b>	<b>VALUE OF WORK</b>	<b>YEAR COMPLETED</b>

SIGNATURE: .....  
(of person authorised to sign on behalf of the Tenderer)

DATE: .....

Tenderers to attach CV of the following proposed site staff:

1. **Contracts Manager**
2. **Site Agent**
3. **Foreman**

S	Proposed key Personnel	Experience	Points	Score (S)
	Contracts Manager Name:	Relevant Professional Registration with ECSA or SACPCMP with more than 8 years' appropriate experience in the built environment (Civil Engineering)	6	
	Construction Manager/Site Agent <b>Note:</b> The Construction Manager must not be the same person as the Contracts Manager Name:	Relevant Professional Registration with ECSA or SACPCMP with more than 8 years of appropriate experience in the built environment (Civil Engineering)	7	
	Foreman Name:	With more than 10 years' experience in the built environment (civil engineering), specifically water related projects.	7	
	<b>Possible Full Points =</b>		<b>20</b>	
	<b>Actual Points Obtained S =</b>			



**FORM T: Rates for Special Materials**

Each material dealt with as a special material in terms of Clause 4 of the Contract Price Adjustment Schedule of the Conditions of Contract is stated in the list below. The rates and prices for the special materials shall be furnished by the Tenderer, which rates and prices shall not include VAT but shall include all other obligatory taxes and levies.

SPECIAL MATERIAL	UNIT*	Rate or Price for the Base Month

Indicate whether the material will be delivered in bulk or in containers.

**Notes to Tenderer:**

**When called upon to do so, the tenderer shall substantiate the above rates or prices with acceptable documentary evidence.**

Signed: ..... Date: .....

Name: ..... Position: .....

**SIGNATURE:** ..... **DATE:** .....  
(of person authorised to sign on behalf of the Tenderer)

**FORM U: Contractor's Health and Safety Declaration**

In terms of Clause 4(4) of the OHS Act 1993 Construction Regulations 2003 (referred to as "the Regulations" hereafter), a Contractor may only be appointed to perform construction work if the Employer is satisfied that the 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 OHS Act 1993 Construction Regulations 2003.

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 OHS Act 1993 Construction Regulations 2003.
2. I hereby declare that my company / enterprise 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 hereby undertake, if my tender is accepted, to provide a sufficiently documented Health and Safety Plan in accordance with Regulation 5(1) of the Construction Regulations, approved by the Employer or his representative, before I will be allowed to commence with construction work under the contract. I hereby agree that my company/enterprise will not have a claim for compensation for delay or extension of time because of my failure to obtain the necessary approval for the said safety plan.
4. I confirm that copies of my company's approved Health and Safety Plan, the Employer's Safety Specifications as well as the OHS Act 1993 Construction Regulations 2003 will be provided on site and will at all times be available for inspection by the Contractor's personnel, the Employer's personnel, the Engineer, visitors, and officials and inspectors of the Department of Labour.
5. I hereby confirm that adequate provision has been made in my 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 OHS Act 1993 Construction Regulations 2003, including the cost for specific items that may be scheduled in the bill of quantities.
6. I hereby confirm that I will be liable for any penalties that may be applied by the Employer in terms of the said Regulations for failure on my part to comply with the provisions of the Act and the Regulations as set out in Regulation 30 of the Regulations.
7. I agree that my failure to complete and execute this declaration to the satisfaction of the Employer will mean that I am unable to comply with the requirements of the OHS Act 1993 Construction Regulations 2003, and accept that my tender will be prejudiced and may be rejected at the discretion of the Employer.
8. I am aware of the fact that, should I be awarded the contract, I must submit the notification required in terms of Regulation 3 of the OHS Act 1993 Construction Regulations 2003 (*example attached hereafter*) before I will be allowed to proceed with any work under the contract.

SIGNATURE: ..... DATE: .....  
(of person authorised to sign on behalf of the Tenderer)

**PRO FORMA NOTIFICATION FORM IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993 , CONSTRUCTION REGULATIONS 2003**

***[In terms of Regulation 3 of the Construction Regulations 2003, the successful Tenderer must complete and forward this form prior to commencement of work to the office of the Department of Labour.]***

- 1. (a) Name and postal address of Contractor: .....
- .....
- (b) Name of Contractor's contact person: .....
- Telephone number: .....
- 2. Contractor's compensation registration number: .....
- 3. (a) Name and postal address of client: .....
- .....
- (b) Name of client's contact person or agent:.....
- Telephone number .....
- 4. (a) Name and postal address of designer(s) for the project: .....
- .....
- (b) Name of designer's contact person: .....
- Telephone number .....
- 5. Name of Contractor's construction supervisor on site appointed in terms of Regulation 6(1): .....
- Telephone number: .....
- 6. Name/s of Contractor's sub-ordinate supervisors on site appointed in terms of regulation 6(2).  
    .....
- 7. Exact physical address of the construction site or site office: .....
- .....
- 8. Nature of the construction work: .....
- .....
- 9. Expected commencement date: .....
- 10. Expected completion date: .....
- 11. Estimated maximum number of persons on the construction site: .....
- 12. Planned number of subcontractors on the construction site accountable to Contractor: .....
- 13. Name(s) of subcontractors already chosen: .....
- .....
- .....

SIGNED BY:

CONTRACTOR:..... DATE:.....

CLIENT:..... DATE:.....

HARRY GWALA DISTRICT MUNICIPALITY

CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

CONTRACT HGDM 821/HGDM/2022

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**FORM V: UIF Registration Certificate**

*Tenderers to attach copy of UIF Registration Certificate*

**FORM W: Certificate of Municipal Services**

Information required in terms of the Harry Gwala District Municipality’s Supply Chain Management Policy. Latest municipal services account statement must be attached.

<b>Tender Number:</b>	<b>HGDM821/HGDM/2022</b>
<b>Name of the Tenderer:</b>	_____

**FURTHER DETAILS OF THE BIDDER/S: Proprietor / Director(s) / Partners, etc:**

Physical Business address of the Bidder	Municipal Account Number(s)

If there is not enough space for all the names, please attach the additional details to the Tender document.

Name of Director / Member / Partner	Identity Number	Physical <b>residential</b> address of Director / Member / Partner	Municipal Account number(s)

I, \_\_\_\_\_, the undersigned,  
*(full name in block letters)*

**certify that the information furnished on this declaration form is correct and that I/we have no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days.**

\_\_\_\_\_  
 Signature

THUS DONE AND SIGNED for and on behalf of the Bidder / Contractor

at \_\_\_\_\_ on the \_\_\_\_\_ day of \_\_\_\_\_ 2023

**Please note:**

Even if the requested information is not applicable to the Bidder, the table above should be endorsed **NOT APPLICABLE** and **THIS DECLARATION MUST STILL BE SIGNED**.

**MUNICIPAL SERVICES STATEMENT**

***Tenderers are to attach the latest statement (not more than 3 months old) from the municipality where the Tenderer receives municipal services***

**FORM X: Quality Management System (Quality Assurance Plan & Control Procedures)**

Tenderer must submit proof of quality management system that they use in the conduct of their business . and construction processes.

**Certified Quality Management System**

Please attach ISO 9001 certificate by a certifying body e.g., South African National Standards or other recognised certifying bodies.

**OR**

**Internal / Own Quality Management System**

Attach an abridged version / summary version of own quality document.

Signed: ..... Date: .....

Name: ..... Position: .....

SIGNATURE: ..... DATE: .....  
*(of person authorised to sign on behalf of the Tenderer)*

X	Score one status as listed below	Points	Score (S)
	ISO 9001 Accreditation	10	
	Own Internal QA Plan	6	
	None	0	
	<b>Possible Full Points =</b>	<b>10</b>	
	<b>Actual Points Obtained X</b>	<b>=</b>	

\*for office use only\*

**FORM Y: Supply Chain Management Policy**

**56. SUBCONTRACTING AS CONDITION OF TENDER**

- 9.(1)** If feasible to subcontract for a contract above R30 million, an organ of state must apply subcontracting to advance designated groups.
- (2)** If an organ of state applies subcontracting as contemplated in sub regulation (1), the organ of state must advertise the tender with a specific tendering condition that the successful tenderer must subcontract a minimum of threshold of the value of the contract as follows:
- If a tender exceeding R5 million(VAT Incl.) is awarded to a big contractor as determined by the complexity of the project, 10% would be allocated to local black emerging contractors with preference being given to entities which are 51% owned by youth, women, people living with disabilities or co-operatives. A minimum of one subcontractor being appointed.
  - If a tender exceeding R10 million(VAT Incl.) is awarded to a big contractor as determined by the complexity of the project, 15% would be allocated to local black emerging contractors with preference being given to entities which are 51% owned by youth, women, people living with disabilities or co-operatives. A minimum of one subcontractor being appointed.
  - If a tender exceeding R20 million(VAT Incl.) is awarded to a big contractor as determined by the complexity of the project, 20% would be allocated to local black emerging contractors with preference being given to entities which are 51% owned by youth, women, people living with disabilities or co-operatives. A minimum of two subcontractors being appointed.
  - If a tender exceeding R30 million(VAT Incl.) is awarded to a big contractor as determined by the complexity of the project, 30% would be allocated to local black emerging contractors which is 51% owned by youth, women, people living with disabilities or co-operatives. A minimum of three subcontractors being appointed.

The subcontracting will only cater for local businesses who will be appointed by the Main contractor on a rotational basis from a roster to be maintained by the municipality per local area.



## **57. APPROVAL AND IMPLEMENTATION OF POLICY**

This policy shall be implemented as approved by council and effective from 01 July.

**FORM Z: Total Score (Functionality)**

	Criteria	Possible Full Points	Actual Points Obtained
1	Experience In construction of 3MI Water Treatment Works or Higher capacity	25	D1=
2	Experience in the construction of water pumpstation (capable of delivering a minimum duty point of 20l/s and a head of 60m per group) including all the related pipework's, mechanic works and electrical works	15	D2=
3	Experience in laying, bedding, and testing of PVC or Steel pipelines of diameter 150mm or bigger. (Must be water pipelines of length no less than 1500m and include all associated pipework and fittings)	10	D3=
4	Financial Resources	20	H =
5	Experience of Key Personnel	20	S =
6	Quality Assurance Plan and Control Procedures	10	X =
	<b>Total Possible Points</b>	<b>100</b>	<b>Total Points Obtained =</b>

**Note:** Only Eligible for Evaluation if Total points scored are  $\geq 65$  points

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**PART C1: AGREEMENTS AND CONTRACT DATA**

**INDEX**

<b>PART C1: AGREEMENTS AND CONTRACT DATA</b> .....	<b>C2</b>
C1.1 Form of Offer and Acceptance .....	C2
A: Offer .....	C2
B: Acceptance .....	C3
C: Schedule of Deviations .....	C4
D: Confirmation of Receipt .....	C6
<b>PART C1.2 CONTRACT DATA</b> .....	<b>C7</b>
C1.2.1 General Conditions of Contract .....	C7
C1.2.2 Contract Data Provided by Employer .....	C8
C1.2.3 Data Provided by the Contractor .....	C11
C1.3: PERFORMANCE OF GUARANTEE .....	C13
C1.4: DISCLOSURE STATEMENT .....	C16
C1.5: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT No 85 OF 1993 .....	C17
C1.6: ADJUDICATION BOARD MEMBER AGREEMENT .....	C19

## PART C1: AGREEMENTS AND CONTRACT DATA

### C1.1 Form of Offer and Acceptance A:Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a Contract for the procurement of:

**CONTRACT HGDM 821/HGDM/2022**

### CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

The Tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the returnable schedules, and by submitting this offer has accepted the conditions of tender.

By the representative of the tenderer, deemed to be duly authorized, signing this apart 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 PRICE INCLUSIVE OF VALUE ADDED TAX (VAT) IS

.....  
.....  
.....Rand (in words);  
R.....(in figures),

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.

**Signature:** .....  
**Name:** (*in capitals*).....  
**Capacity:** .....  
**Name of Tenderer** (*organisation*): .....  
**Address:** .....  
.....  
.....

Tel: ..... Fax: .....

**Witness:**  
Signature: ..... Name: .....  
Date: ..... CIDB Registration N<sup>o</sup>:.....

**B: Acceptance**

By signing this part of this 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 Agreements and contract data, (which includes this agreement)
- Part C2 Pricing data
- Part C3 Scope of work
- Part C4 Site information

and 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 as 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.

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. Failure to fulfil 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 working 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:** .....

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

**Capacity:** .....

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

**Address:** .....  
.....

**Witness:**

**Signature:** ..... **Name:** .....

**Date:** .....

**C: Schedule of Deviations**

Notes:

1. The extent of deviations from the tender documents issued by the employer prior to the tender closing date is limited to those permitted in terms of the conditions of tender.
2. A tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here.
4. Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract.

**Subject** \_\_\_\_\_  
Details \_\_\_\_\_  
\_\_\_\_\_

**Subject** \_\_\_\_\_  
Details \_\_\_\_\_  
\_\_\_\_\_

**Subject** \_\_\_\_\_  
Details \_\_\_\_\_  
\_\_\_\_\_

**Subject** \_\_\_\_\_  
Details \_\_\_\_\_  
\_\_\_\_\_

**Subject** \_\_\_\_\_  
Details \_\_\_\_\_  
\_\_\_\_\_

By the duly authorised representatives signing this agreement, 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 changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.

**FOR THE TENDERER:**

**Signature:** .....

**Name:** .....

**Capacity:** .....

**Tenderer:** *(Name and address of organisation)*.....  
.....

**Witness :**

**Signature:** .....

**Name:** .....

**Date:** .....

**FOR THE EMPLOYER**

**Signature:** .....

**Name:** .....

**Capacity:** .....

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

**Witness :**

**Signature:** .....

**Name:** .....

**Date:** .....

**D: Confirmation of Receipt**

The Tenderer, (now Contractor), identified in the Offer part of this Agreement hereby confirms receipt from the Employer, identified in the Acceptance part of this Agreement, of one fully completed original copy of this Agreement, including the Schedule of Deviations (if any) today:

The .....(day)

of .....(month)

20.....(year)

at .....(place)

**For the Contractor:**

.....  
Signature

.....  
Name

.....  
Capacity

**Signature and Name of Witness:**

.....  
Signature

.....  
Name



## **PART C1.2      CONTRACT DATA**

### **C1.2.1      General Conditions of Contract**

The General Conditions of Contract for Construction Works (3<sup>RD</sup> Edition 2015) published by the South African Institution of Civil Engineering, Private Bag X200, Halfway House, 1685 is applicable to this contract.

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).

The Contract Data referred to in the General Conditions of Contract follow, with the Data to be completed Employer furnished. The Tenderer is to provide his details in the spaces provided.

**C1.2.2 Contract Data Provided by Employer**

	<b>GCC 2015 Clause</b>	
Defects Liability Period	1.1.1.13	12 months
Name of Employer	1.1.1.15	Harry Gwala District Municipality
Address of Employer	1.2.1.2	40 main Street, Ixopo, 3276 Harry Gwala District Municipality P O Box X501 IXOPO 3276 Email address: <a href="mailto:BiyaseNk@harrygwalmunicipality.gov.za">BiyaseNk@harrygwalmunicipality.gov.za</a> Tel N°: +27 39 834 8700 Fax N°: +27 39 834 2259
Name of Engineer	1.1.1.16	Zimile Consulting Engineers represented by Innocent Masunungure, Pr. Eng.
Address of the Engineer	1.2.1.2	Zimile Consulting Engineers 76 Hope Street Kokstad 4700 Email : <a href="mailto:innocent@zimile.co.za">innocent@zimile.co.za</a> Tel : 039 940 6729
Pricing Strategy	1.1.1.26	Re-measurement Contract
Subcontracting	4.4.7	Add the following new Clause: <b>The contractor will be required to subcontract up to a maximum of 30% of the work to local subcontractors. The work to be subcontracted will be agreed upon with the Employer</b>
Documentation Required Before Commencement of Construction Works	5.3.1	Health and Safety File (Refer to Clause 4.3) Initial Programme (Refer to Clause 5.6) Security (Refer to Clause 6.2) Insurances (Refer to Clause 8.6)
Time to Submit the Documentation Before Commencement with the Works	5.3.2	14 days after the commencement date
Competent Employees	4.11.1	The Contractor shall employ on the Site, for the execution and completion of the Works, the following key employees with the requisite qualifications & experience: "Persons specified on

	GCC 2015 Clause	
		<p>the bid document for scoring purposes under Form S must be the same persons to execute the works during the construction phase"</p> <p><b>Contracts Manager:</b> Registration with ECSA or SACPCMP with more than 8 years' appropriate experience in the built environment (Civil Engineering)</p> <p><b>Construction Manager/Site Agent</b>  <b>Note:</b> The Construction Manager must not be the same person as the Contracts Manager  Registration with ECSA or SACPCMP with more than 8 years of appropriate experience in the built environment (Civil Engineering)</p> <p><b>Foreman:</b> With more than 10 years' experience in the built environment (civil engineering), specifically water related projects</p>
Non-working Days	5.8.1	Sundays
Special Nonworking days	5.8.1	<ol style="list-style-type: none"> <li>1. Public Holidays</li> <li>2. The year-end break commencing on the first day, working day, after 15 December and ending on the first Tuesday after 5 January of the next year</li> </ol>
Penalty for Failing to Complete the Works	5.13.1	(0.0005 x contract value) per calendar day
The Latent Defect Period	5.16.3	10 years
Contract Price Adjustment Schedule	6.8.2	$x = 0,15$ $a = 0,20$ $b = 0,20$ $c = 0,50$ $d = 0,10$  'L' shall be the "Weighted Average" index, P0141, Table A  'F' shall be the "Fuel (Diesel)" index given in P0142.1 Table 12 for KwaZulu Natal
Area for Producer Price Index		Pietermaritzburg
Base Month		Month before closing date of Tenders
Price Adjustments for Special Materials	6.8.3	Price adjustments for variations in the costs special materials are allowed
The Percentage Advance on Materials not yet Built into the Permanent Works	6.10.1.5	80% (subject to provision of Indemnity for Materials on Site)
Limit of Retention Money	6.10.3	10% of Contract Sum

	<b>GCC 2015 Clause</b>	
Value of Plant and Material Supplied by Employer to be included in the insurance sum	8.6.1.1.2	Nil
Amount to cover professional fees for repairing damage and loss	8.6.1.1.3	14% of cost required to reinstate damaged Works
Limit of Indemnity for Liability Insurance	8.6.1.3	R10, 000, 000.00 for each and every claim
Dispute Resolution	10.5.1	Standing Adjudication Board
Number of Adjudication Board Members to be Appointed	10.5.3	One
Dispute Determination	10.7.1	Dispute Determination shall be by Arbitration

SIGNATURE OF TENDERER: .....

DATE: .....

**C1.2.3 Data Provided by the Contractor**

	<b>GCC 2015 Clause</b>																			
Name of Contractor	1.1.1.9	.....																		
Address of Contractor (Physical and Postal)	1.2.1.2	..... ..... ..... .....																		
Tel:		.....																		
Fax:		.....																		
Email:		.....																		
Time for Achieving Practical Completion:	1.1.1.14	18 Months																		
Security to be Provided by Contractor	6.2.1	Refer to Table Below																		
<table border="1"> <thead> <tr> <th>Type of Security</th> <th>Contractor's Choice (Indicate "YES" or "NO")</th> </tr> </thead> <tbody> <tr> <td><i>Is Value Added Tax included in the Contract Sum and value of Works for calculating percentages?</i></td> <td></td> </tr> <tr> <td>Cash deposit of .....% of the Contract Sum</td> <td></td> </tr> <tr> <td>Performance Guarantee of .....% of the Contract Sum</td> <td></td> </tr> <tr> <td>Retention of .....% of the value of Works</td> <td></td> </tr> <tr> <td>Cash Deposit of .....% of the Contract Sum plus Retention of .....% of the value of Works</td> <td></td> </tr> <tr> <td>Performance Guarantee of .....% of the Contract Sum plus Retention of .....% of the value of Works</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>			Type of Security	Contractor's Choice (Indicate "YES" or "NO")	<i>Is Value Added Tax included in the Contract Sum and value of Works for calculating percentages?</i>		Cash deposit of .....% of the Contract Sum		Performance Guarantee of .....% of the Contract Sum		Retention of .....% of the value of Works		Cash Deposit of .....% of the Contract Sum plus Retention of .....% of the value of Works		Performance Guarantee of .....% of the Contract Sum plus Retention of .....% of the value of Works					
Type of Security	Contractor's Choice (Indicate "YES" or "NO")																			
<i>Is Value Added Tax included in the Contract Sum and value of Works for calculating percentages?</i>																				
Cash deposit of .....% of the Contract Sum																				
Performance Guarantee of .....% of the Contract Sum																				
Retention of .....% of the value of Works																				
Cash Deposit of .....% of the Contract Sum plus Retention of .....% of the value of Works																				
Performance Guarantee of .....% of the Contract Sum plus Retention of .....% of the value of Works																				
Price variation of special materials*	6.8.3	.....																		

Type of Special Material	Unit	Rate or Price*
Rate or price for base month of*	6.8.2	.....

**Tenderers are to note that failure to provide a time for completion of the contract will invalidate the tender offer.**

\* **Delete inapplicable**

Signature: .....

Name of Signatory: .....

Date: .....

Name of Tenderer .....

**C1.3: PERFORMANCE GUARANTEE**

For use with the General Conditions of Contractor for Construction Works, Third Edition, 2015.

**GUARANTOR DETAILS AND DEFINITIONS**

“Guarantor“ means: .....

Physical Address: .....

“Employer” means: .....

“Contractor” means: .....

“Engineer” means: .....

“Works” means: .....

“Site” means: .....

“Contract” means: The agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

“Contract Sum” means: The accepted amount inclusive of tax of R .....  
Amount in words: .....

“Expiry Date” means: .....

**CONTRACT DETAILS**

Engineer issues; Interim Payment Certificates, Final Payment Certificate and the Certificate Completion of the Works as defined in the Contract.

**PERFORMANCE GUARANTEE**

1. The Guarantor’s liability shall be limited to the amount of the Guaranteed Sum.
2. The Guarantor’s period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of issue by the Engineer of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and / or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.
3. The Guarantor hereby acknowledges that:
  - 3.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create suretyship;
  - 3.2 its obligation under this Performance Guarantee is restricted to the payment of money.
4. Subject to the Guarantor’s maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

- 4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer in an interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;
- 4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;
- 4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:
  - 5.1 the contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or
  - 5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and
  - 5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/ or the provisional/ final sequestration and / or the provisional liquidation court order.
6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
7. Where the Guarantor has made payment in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.
8. Payment by Guarantor in terms of 4 or shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
9. Payment of the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.
10. The employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from his Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
11. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.



- 12. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
- 13. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as liquid document for the purposes of obtaining a court order.
- 14. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate’s Courts Act No 32 of 1994, as amended, to the jurisdiction of the Magistrate’s Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate’s Court.

Signed at .....

Date .....

Guarantor’s signatory (1) .....

Capacity .....

Guarantor’s signatory (2) .....

Capacity .....

Witness signatory (1) .....

Witness signatory (2) .....

**C1.4: DISCLOSURE STATEMENT**

(Date).....

Contract: (Name).....

Contractor: (Name).....

Employer: (Name).....

Engineer: (Name).....

Dear Sirs,

I am willing and available to serve as (ad-hoc/standing) Adjudication Board Member in the above mentioned Contract.

In accordance with the General Conditions of Contract for Construction Works Adjudication Board Rules relating to disclosure statements by selected or nominated persons to the adjudication, I hereby state that:

1. I shall act with complete impartiality and know of nothing at this time, which could affect my impartiality.
2. I had no previous involvement with this project.
3. I do not have any financial interest in this project.
4. I am not currently employed by the Contractor, Employer or Engineer.
5. I do not have any financial connections with the Contractor, Employer or Engineer.
6. I do not have or not have had a personal relationship with any authoritative member of the Contractor, Employer or the Engineer which could affect my impartiality.
7. I undertake to immediately disclose to the parties any changes in the above position which could affect my impartiality or be perceived to affect the same.

*Should there be any deviation from the foregoing statements, details shall be given hereunder.*

.....  
.....  
.....

I further declare that I am experienced in the work which is carried out under the Contract and in interpreting contract documentation.

Name in full: .....

Signature: .....

**C1.5: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT No 85 OF 1993**

THIS AGREEMENT is made between **HARRY GWALA DISTRICT MUNICIPALITY** (hereinafter called the EMPLOYER) of the one part, herein represented by: .....

.....

in his capacity as: .....

AND: .....

(hereinafter called the CONTRACTOR) of the other part, herein represented by.....

.....

in his capacity as: .....

duly authorized to sign on behalf of the Contractor.

**WHEREAS** the CONTRACTOR is the Mandatory of the EMPLOYER in consequence of an agreement between the CONTRACTOR and the EMPLOYER in respect of

CONTRACT No: ..... (CONTRACT TITLE)

..... for the construction, completion and maintenance of the works;

AND WHEREAS the EMPLOYER and the CONTRACTOR have agreed to enter into an agreement in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act No 85 of 1993, as amended by OHS Act Amendment Act No 181/1993 (hereinafter referred to as the ACT);

**NOW THEREFORE** the parties agree as follows:

1. The CONTRACTOR undertakes to acquaint the appropriate officials and employees of the CONTRACTOR with all relevant provisions of the ACT and the regulations promulgated in terms thereof.
2. The CONTRACTOR undertakes to fully comply with all relevant duties, obligations and prohibitions imposed in terms of the ACT and Regulations: Provided that should the EMPLOYER have prescribed certain arrangements and procedures that same shall be observed and adhered to by the CONTRACTOR, his officials and employees. The CONTRACTOR shall bear the onus of acquainting himself/herself/itself with such arrangements and procedures.
3. The CONTRACTOR hereby accepts sole liability for such due compliance with the relevant duties, obligations, prohibitions, arrangements and procedures, if any, imposed by the ACT and Regulations, and the CONTRACTOR expressly absolves the EMPLOYER and the Employer's CONSULTING ENGINEERS from being obliged to comply with any of the aforesaid duties, obligations, prohibitions, arrangements and procedures in respect of the work included in the contract.

- 4. The CONTRACTOR agrees that any duly authorized officials of the EMPLOYER shall be entitled, although not obliged, to take such steps as may be necessary to ensure that the CONTRACTOR has complied with his undertakings as more fully set out in paragraphs 1 and 2 above, which steps may include, but shall not be limited to, the right to inspect any appropriate site or premises occupied by the CONTRACTOR, or to take such steps it may deem necessary to remedy the default of the CONTRACTOR at the cost of the CONTRACTOR.
  
- 5. The CONTRACTOR shall be obliged to report forthwith to the EMPLOYER any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the ACT and Regulations, pursuant to work performed in terms of this agreement, and shall, on written demand, provide full details in writing of such investigation, complaint or criminal charge.

Thus signed at ..... for and on behalf of the **CONTRACTOR**

on this the ..... day of ..... 20.....

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. ....

2. ....

Thus signed at ..... for and on behalf of the **EMPLOYER**

on this the ..... day of ..... 20.....

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. ....

2. ....

**C1.6: ADJUDICATION BOARD MEMBER AGREEMENT**

This Agreement is entered into between:

Adjudication Board Member: *(Name, physical address, postal address, email address, fax number, telephone number and mobile number)*.....  
.....  
.....

Contractor: *(Name, physical address, postal address, email address, fax number, telephone number and mobile number)*.....  
.....  
.....

Employer: *(Name, physical address, postal address, email address, fax number, telephone, number and mobile number)*.....  
.....  
.....

The contractor and the Employer will hereinafter be collectively referred to as “the Parties”.

The Parties entered into a Contract for .....  
*(name of project)* which provides that a dispute under or in connection with the General Conditions of Contract for Construction Works, Second Edition, 2015, must be referred to *(ad-hoc adjudication/ standing adjudication\*\*)*.

The undersigned natural person has been appointed to serve as Adjudication Board Member and together with the undersigned Parties agree as follows:

1. The Adjudication Board Member accepts to perform his duties in accordance with the terms of the Contract, the General Conditions of Contract for Construction Works Adjudication Board Rules and this Agreement.
2. The Adjudicator undertakes to remain independent and impartial of the Contractor, Employer and Engineer for the duration of the Adjudication Board proceedings.
3. The Adjudication Board Member agrees to serve for the duration of the Adjudication Board proceedings.
4. The Parties may at any time, without cause and with immediate effect, jointly terminate this Agreement.

- 5. Unless the Parties agree, the Adjudication Board Member shall not act as arbitrator or representative of either Party in any subsequent proceedings between the Parties under the Contract. No Party may call the Adjudication Board Member as a witness in any such subsequent proceedings.
- 6. The standing Adjudication Board’s duties shall end upon the Adjudication Board Member(s) receiving notice from the Parties of their joint decision to disband the Adjudication Board.
- 7. The Adjudication Board Member shall be paid in respect of time spent upon or in connection with the adjudication including time spent travelling:
  - a. A monthly retainer of R.....(*amount*) for .....(*number*) of months, and /or
  - b. A daily fee of R.....(*amount*) based on a .....(*number*) hour day, and /or
  - c. A hourly fee of R.....(*amount*), and /or
  - d. A non- recurrent appointment fee of R.....(*amount*) which shall be accounted for in the final sums payable.
- 8. The Adjudication Board Member’s expenses incurred in adjudication work shall be reimbursed at cost.

Upon submission of an invoice for fees and expenses to the Parties, the (*Contractor/ Employer\*\**) shall pay the full amount within 28 days of receipt of the invoice and he shall be reimbursed by the other party by half the amount so that the fees and expenses are borne equally by the Parties. Late payment of such invoice shall attract the interest at prime plus 3% points compounded monthly at the prime rate changed by the Adjudication Board Member’s bank.

This Agreement is entered into by:

Contractor’s Signature : .....

Contractor’s name : .....

Place : .....

Date : .....

Employer’s signature : .....

Employer’s name : .....

Place : .....

Date : .....

Adjudication Board Member's signature : .....

Adjudication Board Member's name : .....

Place : .....

Date : .....

*\*\*Delete the inapplicable party*

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT No. HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**PART C2: PRICING DATA**

**INDEX**

<b>PART C2: PRICING DATA</b> .....	<b>PD2</b>
C2.1 Pricing Instructions .....	PD2
C2.2 Schedule of Quantities.....	PD6



## PART C2: PRICING DATA

### C2.1 Pricing Instructions

- 1 The Conditions of Contract, the Contract Data, the Specifications (including the Project Specifications) and the Drawings shall be read in conjunction with the Bill of Quantities.
- 2 The Bill comprises items covering the Contractor's profit and costs of general liabilities and of the construction of Temporary and Permanent Works.

Although the Tenderer is at liberty to insert a rate of his own choosing for each item in the Bill, he should note the fact that the Contractor is entitled, under various circumstances, to payment for additional work carried out and that the Engineer is obliged to base his assessment of the rates to be paid for such additional work on the rates the Contractor inserted in the Bill. Clause 8 of each Standardized Specification, and the measurement and payment clause of each Particular Specification, read together with the relevant clauses of the Project Specifications, all set out which ancillary or associated activities are included in the rates for the specified operations

- 3 Descriptions in the Bill of Quantities are abbreviated and may differ from those in the Standardized and Project Specifications. No consideration will be given to any claim by the Contractor submitted on such a basis. The Bill has been drawn up generally in accordance with the latest issue of Civil Engineering Quantities. Should any requirement of the measurement and payment clause of the appropriate Standardized or Project Specification(s) be contrary to the terms of the Bill or, when relevant, to the Civil Engineering Quantities, the requirement of the appropriate Standardized, Project, or Particular Specification as the case may be, shall prevail
- 4 Unless stated to the contrary, items are measured net in accordance with the Drawings without any allowance having been made for waste.
- 5 The amounts and rates to be inserted in the Bill of Quantities shall be the full inclusive amounts to the Employer for the work described under the several items. Such amounts shall cover all the costs and expenses that may be required in and for the construction of the work described, and shall cover the costs of all general risks, profits, taxes (but excluding value-added tax), liabilities and obligations set forth or implied in the documents on which the Tender is based.
- 6 An amount or rate shall be entered against each item in the Bill of Quantities, whether or not quantities are stated. An item against which no amount or rate is entered will be considered to be covered by the other amounts or rates in the Bill.

The Tenderer shall also fill in a rate against the items where the words "rate only" appear in the amount column. Although no work is foreseen under these items and no quantities are consequently given in the quantity column, the tendered rates shall apply should work under these items actually be required.

Should the Tenderer group a number of items together and tender one sum for such group of items, the single tendered sum shall apply to that group of items and not to each individual item, or should he indicate against any item that full compensation for such item has been included in another item, the rate for the item included in another item shall be deemed to be nil.

The tendered rates, prices and sums shall, subject only to the provisions of the Conditions of Contract, remain valid irrespective of any change in the quantities during the execution of the Contract.

- 7 The quantities of work as measured and accepted and certified for payment in accordance with the Conditions of Contract, and not the quantities stated in the Bill of Quantities, will be used to determine payments to the Contractor. The validity of the Contract shall in no way be affected by differences between the quantities in the Bill of Quantities and the quantities certified for payment.

**Ordering of materials** are not to be based on the Bill of Quantities, but only on information issued for construction purposes.

## 8 PROVISIONAL SUM

Where Provisional sums or Prime Cost sums are provided for items in the Bill of Quantities, payments for the Work done under such items will be made accordance with Clause 6.6 of **GCC 2015 (3<sup>rd</sup> Edition) of the General Condition 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, such approval shall be granted by the Executive Director Infrastructure Services as delegated by the Accounting Officer.

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. Unauthorized changes made by the Tenderer to provisional items in the Bill of Quantities, or to the stated provisional percentages and sums in the Summary of the Bill of Quantities, will not be permissible.

## 9 CONTINGENCY

The sum provided under contingency in the Bill of Quantities is under the sole control of the Employer and may be deducted in whole or in part and shall only be expended by order of the Employer as Variation Order. The use of contingency shall be upon approval by the Executive Director Infrastructure Services as delegated by the Accounting Officer.

Director Infrastructure Services as delegated by the Accounting Officer.

## 10 PAYMENT FOR THE LABOUR-INTENSIVE COMPONENT OF THE WORKS

Those parts of the works to be constructed using labour-intensive methods are marked in the bill of quantities with the letters LI either in a separate column or as a prefix or suffix against every item so designated. The works, or parts of the works so designated are to be constructed using labour-intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a deviation from the contract. The items marked with the letters LI are not necessarily an exhaustive list of all the activities which must be done by hand and this clause does not over-ride any of the requirements in the generic labour-intensive specification in the Scope of Works.

Where minimum labour intensity is specified in the design, the contractor is expected to use their initiative to identify additional activities that can be done labour-intensively in order to comply with the set minimum labour intensity targets.

Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment. Any non-payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict

11. Linkage of Payment for Labour-Intensive Component of Works to Submission of Project Data

The Contractor's payment invoices shall be accompanied by labour information for the corresponding period in a format specified by the employer. If the contractor chooses to delay submitting payment invoices, labour returns shall still be submitted as per frequency and timeframes stipulated by the Employer. The contractor's invoices shall not be paid until all pending labour information has been submitted. The client may institute a penalty relating to outstanding labour information.

The following information shall be maintained on site and submitted in electronic/hard copy formats:

- Certified ID copies of all locally employed labour
- Signed Contracts between the employer and the EPWP Participants
- Attendance Registers for the EPWP Participants
- Proof of Payment of EPWP Employees
- Monthly Reporting Template as per EPWP requirements

10 The units of measurement indicated in the Bill of Quantities are metric units. The following abbreviations may appear in the Bill of Quantities:

mm	=	millimetre
m	=	metre
km	=	kilometre
km-pass	=	kilometre-pass
m <sup>2</sup>	=	square metre
m <sup>2</sup> -pass	=	square metre-pass
ha	=	hectare
m <sup>3</sup>	=	cubic metre
m <sup>3</sup> -km	=	cubic metre-kilometre
kW	=	kilowatt
kN	=	kilonewton
kg	=	kilogram
t	=	ton (1 000 kg)
%	=	per cent
MN	=	meganewton
MN-m	=	meganewton-metre
PC Sum	=	Prime Cost Sum
Prov Sum	=	Provisional Sum
No.	=	number

11 For the purposes of this Bill of Quantities, the following words shall have the meanings hereby assigned to them:

Unit : The unit of measurement for each item of work as defined in the Standardized, Project or Particular Specifications

- Quantity : The number of units of work for each item
- Rate : The payment per unit of work at which the Tenderer tenders to do the work
- Amount : The quantity of an item multiplied by the tendered rate of the (same) item
- Sum : An amount tendered for an item, the extent of which is described in the Bill of Quantities, the Specifications or elsewhere, but of which the quantity of work is not measured in units

## C2.2 Schedule of Quantities

HARRY GWALA DISTRICT MUNICIPALITY  
 CREIGHTON BULK WATER SUPPLY SCHEME  
 CONTRACT NUMBER: HGDM 821/HGDM/2022  
 UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

**SCHEDULE OF QUANTITIES**

BILL OF QUANTITIES - SUMMARY		
SECTION	DESCRIPTION	AMOUNT
1	PRELIMINARY AND GENERAL	
2	EARTHWORKS	
3	CONCRETE AND STRUCTURAL WORKS	
4	PIPELINES	
5	BUILDING WORKS	
6	ROAD WORKS AND STORMWATER	
7	ELECTRICAL WORKS	
7.0	P&G ELECTRICAL	
7.1	POWER SUPPLY	
7.2	PUMP STATION CONTROL	
7.3	PC & PSUMS ELECTRICAL	
8	MECHANICAL WORKS	
9	RETAINER WALLS	
10	FENCING	
11	MED-PRESSURE PIPELINES	
12	BEDDING	
13	EARTHWORKS	
14	PIPELINE CHAMBER - MECHNICAL	
15	PUMPSTATION - CONCRETE (STRUCTURAL)	
16		<b>SUB-TOTAL</b>
17		<b>ADD 10% CONTINGENCIES OF SUB TOTAL</b>
18		<b>ADD ESCALATION @ 5%</b>
19		<b>TOTAL CONSTRUCTION COST</b>
20		<b>VALUE ADDED TAX AT 15%</b>
21		<b>BID PRICE CARRIED FORWARD TO FORM OF OFFER AND ACCEPTANCE</b>

**HARRY GWALA DISTRICT MUNICIPALITY**

**CREIGHTON BULK WATER SUPPLY SCHEME**

**CONTRACT NUMBER: HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**

**SECTION 1: PRELIMINARY & GENERAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<b>SANS1200 A</b>	<b>SECTION 1: PRELIMINARY AND GENERAL</b>				
	<b>8.3</b>	<b>SCHEDULED FIXED-CHARGE AND VALUE-RELATED ITEMS</b>				
1.001	8.3.1	Contractual Requirements	Sum	1		
	<b>8.3.2</b>	<b><i>Establishment of Facilities on the Site:</i></b>				
	<b>8.3.2.1</b>	<b>Facilities for Engineer</b>				
1.002	8.3.2.1 a), PSA 6.1.2.1, PSAB 2.2, PSAB 2.3	Furnished offices and accommodation	Sum	2		
1.003	8.3.2.1 b) PSAB 3.1	Provision of cellular phone (iPhone 14 Plus)	Sum	2		
1.004	8.3.2.1 c) PSAB 3.1	i7 laptop complete with printer, modem with 4G connection	Sum	2		
1.005	8.3.2.1 d) PSAB 2.1	Project nameboards	Sum	2		
	<b>8.3.2.2</b>	<b>Facilities for Contractor</b>				
1.006	8.3.2.2 a), PS 4, PSA 4.2	Offices and storage sheds	Sum	1		
1.007	8.3.2.2 e), PS 4	Abution and latrine facilities	Sum	1		
1.008	8.3.2.2 f)	Tools and equipment	Sum	1		
1.009	8.3.2.2 g), PS 4	Water supplies, electric power and communications	Sum	1		
1.010	8.3.2.2 h), PSA 6.1.3	Dealing with water	Sum	1		
1.011	8.3.2.2 j) PSA 5.3	Access to the Works	Sum	1		
1.012	8.3.3	General Responsibilities and Other Fixed-charge Obligations	Sum	1		
1.013	8.3.4, PSA 4.3, PSA 5.3	Removal of Site Establishment	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
1.014	PS 5, PSA 6.1.1, PSA 6.1.4, PA	All fixed-charge and value-related costs associated with full compliance of the Contractor with the Occupational Health and Safety Act, Act 85 of 1993, including all COVID-19 compliance and mitigation measures, in accordance with the Harry Gwala District Municipalities' requirements	Sum	1		
1.015	PS 2.5. PSA 6.1.5	All fixed-charge and value-related costs associated with full compliance of the Contractor with the Environmental Management Programme	Sum	1		
	<b>8.4</b>	<b>SCHEDULED TIME-RELATED ITEMS</b>				
1.016	8.4.1	Contractual Requirements	Mths	18		
1.017	8.4.2, PS 7	Operate and maintain facilities on the site for the duration of construction	Mths	18		
	<b>8.4.2.1</b>	<b>Facilities for Engineer</b>				
1.018	8.4.2.1 a), PSA 6.1.2.1, PSAB 2.2. PSAB 2.3	Furnished offices and accommodation	Mths	18		
1.019	8.4.2.1 b) PSAB 3.1	Telephone, laptop and internet access facilities	Mths	18		
1.020	8.4.2.1 d), PSAB 4.1 & 4.2	Survey assistant / equipment	Mths	18		
	<b>8.4.2.2</b>	<b>Facilities for Contractor</b>				
1.021	8.4.2.2 a), PS 4, PSA 4.2	Offices and storage sheds	Mths	18		
1.022	8.4.2.2 e), PS 4	Ablution and latrine facilities	Mths	18		
1.023	8.4.2.2 f)	Tools and equipment	Mths	18		
1.024	8.4.2.2 g), PS 4	Water supplies, electric power and communications	Mths	18		
1.025	8.4.2.2 h), PSA 6.2.2	Dealing with water	Mths	18		
1.026	8.4.3	Supervision for the Duration of the Contract	Mths	18		
1.027	8.4.4	Company and Head Office Overhead Costs	Mths	18		
1.028	8.4.5	General Responsibilities and Other Time-related Obligations	Mths	18		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
1.029	PS 2.5, PSA 6.2.4	All time-related costs with regard to the Contractors obligations in respect of compliance with the Environmental Management Programme for the duration of the Contract	Mths	18		
	<b>8.5</b>	<b>SUMS STATED PROVISIONALLY BY THE ENGINEER</b>				
1.030		Additional testing as instructed by the Engineer	Sum	1	R30 000.00	R30 000.00
1.031		Management, Overheads, Charges & Profit on Item 1.030	%	10%	R30 000.00	R3 000.00
1.032		Allowance for a Community Liaison Officer for the duration of the Contract (contract duration of 18 months)	Sum	1	R90 000.00	R90 000.00
1.033		Management, Overheads, Charges & Profit on Item 1.032	%	10%	R90 000.00	R9 000.00
1.034	PSA 6.2.1	Allowance for accredited off site training of local employees including transport and accommodation of trainees	Sum	1	R55 000.00	R55 000.00
1.035		Management, Overheads, Charges & Profit on Item 1.034	%	10%	R55 000.00	R5 500.00
1.036	PSAB 2.1	Allowance for the supply and erection of a permanent nameboard at the entrance to the Water Treatment Works at the completion of the Contract	Sum	1	R5 500.00	R5 500.00
1.037		Management, Overheads, Charges & Profit on Item 1.036	%	10%	R5 500.00	R550.00
1.038	PSAB 2.1	Allowance for the supply and erection of permanent signage at the Water Treatment Works at the completion of the Contract, in order to ensure compliance with the Occupational Health & Safety Act, Act 85 of 1993	Sum	1	R11 000.00	R11 000.00
1.039		Management, Overheads, Charges & Profit on Item 1.038	%	10%	R11 000.00	R1 100.00
1.040		Allowance for monthly site inspections of the works by the Water Treatment Works specialist design team for the duration of the Contract (contract duration of 18 months)	Sum	1	R850 000.00	R850 000.00
1.041		Management, Overheads, Charges & Profit on Item 1.040	%	10%	R850 000.00	R85 000.00
1.042		Allowance for landscaping of site	Sum	1	R100 000.00	R100 000.00
1.043		Management, Overheads, Charges & Profit on Item 1.042	%	10%	R100 000.00	R10 000.00
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.7</b>	<b>DAYWORKS</b>				
		<b>Labour</b>				
1.044		a) Unskilled	hr	150		
1.045		b) Semi-skilled	hr	100		
1.046		c) Skilled	hr	50		
		<b>Plant</b>				
1.047		Allowance for plant used under Dayworks items	Prov Sum	1	R40 000.00	R40 000.00
1.048		Management, Overheads, Charges & Profit on Item 1.047	%	10%	R40 000.00	R4 000.00
		<b>Materials</b>				
1.049		Allowance for materials used under Dayworks items	Prov Sum	1	R40 000.00	R40 000.00
1.050		Management, Overheads, Charges & Profit on Item 1.049	%	10%	R40 000.00	R4 000.00
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**

**CREIGHTON BULK WATER SUPPLY SCHEME**

**CONTRACT NUMBER: HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**

**SECTION 2: EARTHWORKS**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 2: EARTHWORKS</b>				
		<b>NEW SPLITTER BOX</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.001	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	68		
2.002	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	7		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.003	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	11		
	<b>8.3.2 b)</b>	<b>Extra over item 2.003 for:</b>				
2.004		a) Boulder excavation (Classes A and B)	m <sup>3</sup>	5		
2.005		b) Hard rock excavation	m <sup>3</sup>	6		
		<b>Imported Fill Material</b>				
2.006	8.3.4 a)	Extra over for importation of G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	8		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CLEARWATER RESERVOIRS</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.007	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	2942		
2.008	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	294		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.009	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	341		
	<b>8.3.2 b)</b>	<b>Extra over item 2.009 for:</b>				
2.010		a) Boulder excavation (Classes A and B)	m <sup>3</sup>	144		
2.011		b) Hard rock excavation	m <sup>3</sup>	144		
	<b>8.3.4</b>	<b>Imported Fill Material</b>				
2.012	8.3.4 a)	Extra over for importation of G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	2076		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>NEW SEDIMENTATION TANK</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.013	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	574		
2.014	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	58		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.015	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	77		
	<b>8.3.2 b)</b>	<b>Extra over item 2.015 for:</b>				
2.016		a) Boulder excavation (Classes A and B)	m <sup>3</sup>	36		
2.017		b) Hard rock excavation	m <sup>3</sup>	36		
	<b>8.3.4</b>	<b>Imported Fill Material</b>				
2.018	8.3.4 a)	Extra over for importation of G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	420		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>FILTERS / TREATMENT WORKS BUILDING</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.019	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	859		
2.020	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	86		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.021	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	38		
	<b>8.3.4</b>	<b>Imported Fill Material</b>				
2.022	8.3.4 a)	Extra over for importation of G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	518		
2.023	LI	Supply and plant indigenous trees around the works including provision of compost and watering until established	No.	2		
2.024	LI	Supply and plant indigenous shrubs around the works including provision of compost and watering until established	No.	20		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>PLATFORMS</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.2</b>	<b>Bulk Fills</b>				
2.025	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Backfill to finished floor levels to Platforms around Sedimentation Tank, WTW & Reservoirs, as well as Surface Bed Level under Pumpstation floors, using G7 material imported from commercial sources. All fill materials to be compacted to 93% MAMDD, all as directed by the Engineer.	m <sup>3</sup>	1566		
		<b>Topsoiling</b>				
2.026	8.3.10, LI	Excavate from topsoil stockpile, placement and spreading around the structure to a nominal depth of 150mm as directed by the Engineer	m <sup>2</sup>	4800		
		<b>Grassing</b>				
2.027	8.3.11, PSD 4.1.3, LI	Supply of grass sods including watering, maintaining etc. for the duration of the contract	m <sup>2</sup>	4800		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>SLUDGE DAM</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.028	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	482		
2.029	8.3.1.2	Remove topsoil to a nominal depth of 150mm and stockpile for reuse	m <sup>2</sup>	48		
	<b>SANS1200DM</b>	<b>Imported Fill Material</b>				
2.030	8.3.4 a)	Borrow to Fill G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	440		
		<b>Topsoiling</b>				
2.031	8.3.10, LI	Excavate from topsoil stockpile, placement and spreading around the structure to a nominal depth of 150mm as directed by the Engineer	m <sup>2</sup>	540		
		<b>Grassing</b>				
2.032	8.3.11, PSD 4.1.3, LI	Supply of grass sods including watering, maintaining etc. for the duration of the contract	m <sup>2</sup>	540		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>GUARD HOUSE</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.033	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	68		
2.034	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	7		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.035	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	11		
	<b>8.3.2 b)</b>	<b>Extra over item 2.035 for:</b>				
2.036		a) Boulder excavation (Classes A and B)	m <sup>3</sup>	5		
2.037		b) Hard rock excavation	m <sup>3</sup>	6		
		<b>Imported Fill Material</b>				
2.038	8.3.4 a)	Extra over for importation of G7 fill material from commercial sources, compacted to 93% MAMDD in 150 mm thick layers (including hauling the material over an unlimited free-haul distance)	m <sup>3</sup>	8		
		<b>Topsoiling</b>				
2.039	8.3.10, LI	Excavate from topsoil stockpile, placement and spreading around the structure to a nominal depth of 150mm as directed by the Engineer	m <sup>2</sup>	26		
		<b>Grassing</b>				
2.040	8.3.11, PSD 4.1.3, LI	Supply of grass sods including watering, maintaining etc. for the duration of the contract	m <sup>2</sup>	26		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CHAMBERS</b>				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
	<b>8.3.1</b>	<b>Site Preparation</b>				
2.041	8.3.1.1	Clear and grub for structure as directed by the Engineer	m <sup>2</sup>	149		
2.042	8.3.1.2	Remove topsoil to a nominal depth of 100mm and stockpile for reuse	m <sup>2</sup>	14		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.043	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate in all materials to the level required for the structure for strip footings and surface bed platform, stockpile and use for future backfill around structure. Surplus materials to be disposed of at an approved dumping site within a freehaul distance of 1.0 km, all as directed by the Engineer.	m <sup>3</sup>	342		
	<b>8.3.2 b)</b>	<b>Extra over item 2.043 for:</b>				
2.044		a) Boulder excavation (Classes A and B)	m <sup>3</sup>	156		
2.045		b) Hard rock excavation	m <sup>3</sup>	156		
		<b>Topsoiling</b>				
2.046	8.3.10, LI	Excavate from topsoil stockpile, placement and spreading around the structure to a nominal depth of 150mm as directed by the Engineer	m <sup>2</sup>	76		
		<b>Grassing</b>				
2.047	8.3.11, PSD 4.1.3, LI	Supply of grass sods including watering, maintaining etc. for the duration of the contract	m <sup>2</sup>	76		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>DEMOLITION OF EXISTING STRUCTURES</b>				
	<b>SANS1200 C</b>	<b>SITE CLEARANCE</b>				
	<b>8.2.8, PI</b>	<b>Demolish and Remove Structures</b>				
2.048		Demolish existing office / toilet building and chemical dosing room (see Drawing No. 316WS-C.01) and transport material to approved dumping facility	Sum	1		
2.049		Demolish existing 3 No. clearwater reservoirs (see Drawing No. 316WS-C.01) and transport material to approved dumping facility	Sum	1		
	<b>8.3.2</b>	<b>Bulk Excavation</b>				
2.050	8.3.2 a), PSD 2.1.1, PSD 2.1.2, PSD 3.3.1	Excavate to expose existing structures before demolition, stockpile and use for future backfill as directed by the Engineer.	m <sup>3</sup>	180		
		<b>Topsoiling</b>				
2.051	8.3.10, LI	Excavate from topsoil stockpile, placement and spreading over backfilled areas to a nominal depth of 150mm as directed by the Engineer	m <sup>2</sup>	180		
		<b>Grassing</b>				
2.052	8.3.11, PSD 4.1.3, LI	Supply of grass sods including watering, maintaining etc. for the duration of the contract	m <sup>2</sup>	180		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**SCHEDULE OF QUANTITIES**  
**SECTION 3: CONCRETE & STRUCTURAL WORKS**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 3: CONCRETE / STRUCTURAL WORKS</b>				
		<b>NEW SPLITTER BOX</b>				
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.2</b>	<b>Smooth</b>				
		<i>Plane vertical to:</i>				
3.001		Walls	m <sup>2</sup>	220		
3.002		Sides of exposed slabs	m <sup>2</sup>	5.3		
3.003		Sides of floor slabs and footings	m <sup>2</sup>	6.2		
		<i>Plane horizontal to:</i>				
3.004		Soffits of slabs	m <sup>2</sup>	18		
	<b>8.2.5</b>	<b>Narrow widths (smooth)</b>				
3.005		Over 100 mm and up to 200 mm	m	10.3		
3.006		Over 200 mm and up to 300 mm	m	33		
	<b>8.2.6</b>	<b>Box out holes / form voids</b>				
		<i>Small, area up to and including 0,1 m<sup>2</sup> for the following depths:</i>				
3.007		Up to and including 0.5 m	No.	3		
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>Mild steel bars</b>				
3.008		8 mm dia	kg	22		
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
3.009		10 mm dia	kg	1265		
3.010		12 mm dia	kg	1265		
3.011		16 mm dia	kg	1144		
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
3.012		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	18		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.013		Footings	m <sup>3</sup>	7		
3.014		Walls	m <sup>3</sup>	16.0		
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.015		Walls	m <sup>3</sup>	9		
3.016		Suspended slabs	m <sup>3</sup>	6		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<i>Wood-floated finishes to:</i>				
3.017		Horizontal surfaces	m <sup>2</sup>	18		
		<i>Steel-floated finishes to:</i>				
3.018		Narrow surfaces up to 350 mm wide	m	18		
3.019		Horizontal surfaces	m <sup>2</sup>	18		
	<b>8.5, PSG 3.5.4, PSG 3.5.15</b>	<b>JOINTS</b>				
		<b>Designated joints as detailed on Drawing No. 316WS-S.04</b>				
3.020		Joint Type F	m	18		
	<b>SANS1200 HA</b>	<b>STRUCTURAL STEELWORK (Sundry items)</b>				
	<b>8.3.1</b>	<b>Supply all material and install complete</b>				
3.021		Mentis Inter - Link Handrailing System	m	18		
3.022		Mezzanine Floor Comprising of 2 No. IPE 160 Beams (L=4m each), 2No. 75x50x6L (L=4m each) Angles Recessed into Concrete Edge & 16m <sup>2</sup> x Mentis 40x3 Rectagrid RS40 Flooring	Sum	1		
		<i>Catladder</i>				
3.023		Structural Steel Catladder fabricated from hot dipped galvanized mild steel 65x10mm Flat Stringers & 20mm Dia round bar rungs, & 50x8mm Flat Hoops & Verticals. Height = 7.3m (see Drawing No. 316WS-C.14)	Sum	1		
		Supply and install stainless steel weir plates in accordance with the details on Drawing No. 316WS-C.02				
3.024		Type 1695	No.	1		
3.025		Type 603	No.	2		
	<b>SANS1200 G</b>	<b>WATERTIGHTNESS TESTING</b>				
3.026	PSG 3.5.8	Carry out watertightness testing of structure	No.	1		
3.027	PSG 3.5.8.3	Carry out disinfection of structure	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>NEW SEDIMENTATION TANK</b>				
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.1</b>	<b>Rough</b>				
		<i>Curved vertical to:</i>				
3.028		Walls	m <sup>2</sup>	38.3		
3.029		Sides of floor slabs and footings	m <sup>2</sup>	33		
		<i>Plane vertical to:</i>				
3.030		Sides of floor slabs and footings	m <sup>2</sup>	11.6		
	<b>8.2.2</b>	<b>Smooth</b>				
		<i>Curved vertical to:</i>				
3.031		Walls	m <sup>2</sup>	513		
		<i>Plane vertical to:</i>				
3.032		Sides of piers	m <sup>2</sup>	43		
3.033		Walls	m <sup>2</sup>	81		
3.034		Sides of exposed slabs	m <sup>2</sup>	22		
		<i>Plane horizontal to:</i>				
3.035		Soffits of slabs	m <sup>2</sup>	42		
3.036		Soffit of upstand wall:	m <sup>2</sup>	11		
	<b>8.2.5</b>	<b>Narrow widths (smooth)</b>				
3.037		Over 100 mm and up to 200 mm	m	67		
3.038		Over 200 mm and up to 300 mm	m	64		
	<b>8.2.6</b>	<b>Box out holes / form voids</b>				
		<i>Small, area up to and including 0,1 m<sup>2</sup> for the following depths:</i>				
3.039		Up to and including 0.5 m	No.	5		
		<i>Large, area up to and including 0,5 m<sup>2</sup> for the following depths:</i>				
3.040		Up to and including 0.5 m	No.	1		
		<i>Large, area up to and including 1 m<sup>2</sup> for the following depths:</i>				
3.041		Up to and including 0.5 m	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>Mild steel bars</b>				
3.042		8 mm dia	ton	1		
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
3.043		10 mm dia	ton	2		
3.044		12 mm dia	ton	4		
3.045		16 mm dia	ton	16		
3.046		20 mm dia	ton	9		
3.047		25 mm dia	ton	1		
3.047		32 mm dia	ton	1		
	<b>8.3.2</b>	<b>High-Tensile Welded Mesh</b>				
3.048		Mesh Ref 193 (6m x 2.4m sheets)	m <sup>2</sup>	28		
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
3.049		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	367		
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.050		Footings	m <sup>3</sup>	11.6		
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.051		Footings	m <sup>3</sup>	66		
3.052		Floor slabs	m <sup>3</sup>	35		
3.053		Piers	m <sup>3</sup>	9		
3.054		Walls	m <sup>3</sup>	119		
3.055		Suspended slabs	m <sup>3</sup>	6.9		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<i>Wood-floated finishes to:</i>				
3.056		Horizontal surfaces	m <sup>2</sup>	35		
		<i>Steel-floated finishes to:</i>				
3.057		Narrow surfaces up to 350 mm wide	m	33		
3.058		Horizontal surfaces	m <sup>2</sup>	220		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.5, PSG 3.5.4, PSG 3.5.15</b>	<b>JOINTS</b>				
		<b>Designated joints as detailed on Drawing No. 316WS-S.04</b>				
3.059		Joint Type D	m	96		
3.060		Joint Type E	m	32		
3.061		Joint Type F	m	54		
3.062		Joint Type R	m	63		
		<b>UNDERDRAINAGE SYSTEM</b>				
		Nominal 120 mm thick filter bed - no fines concrete including 20 mm thick mortar skim				
3.063		on inclined founding surfaces	m <sup>2</sup>	238		
3.064	SANS1200 LE, LI	Construct drain complete including excavation, 19 mm stone fill, geofabric blanket and 110mm dia. perforated flexible drainage pipe as shown on Drawing No. 316WS-S.03	m	77		
	<b>SANS1200 HA</b>	<b>STRUCTURAL STEELWORK (Sundry items)</b>				
	<b>8.3.1</b>	<b>Supply all material and install complete</b>				
		<i>Frames / supports for Bridge:</i>				
3.065		Steel Bridge As Detailed, Comprising of 178x171x26-T Top Chord, 127x146x15-T Bottom Chords, 70x70x6-L Diagonal & Vertical Chords, 152x152x31 H Cross Beams, Q Decking and 150mm Thick Slab (4m <sup>2</sup> ) as well as Rectagrid RS40 40x3 Flooring (16m <sup>2</sup> ) - as per Drawing No. 316WS-S.03	kg	6600		
		<i>Catladder</i>				
3.066		Structural Steel Catladder fabricated from hot dipped galvanized mild steel 65x10mm Flat Stringers & 20mm Dia round bar rungs, & 50x8mm Flat Hoops & Verticals. Height = 4.3m (see Drawing No. 316WS- C.14)	Sum	1		
		<i>Weir plate:</i>				
3.067		Supply and install stainless steel sedimentation tank weir plate (length of 53m) in accordance with the details on Drawing No. 316WS-C.02	Sum	1		
		<i>Sedimentation tank cone:</i>				
3.068		Fabricate, supply and install 8mm thick GRP flanged sedimentation tank cone hot dipped galvanised as per Drawing No. 316WS-C.02	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>SANS1200 G</b>	<b>WATERTIGHTNESS TESTING</b>				
3.069	PSG 3.5.8	Carry out watertightness testing of structure	No.	1		
3.070	PSG 3.5.8.3	Carry out disinfection of structure	No.	1		
		<b>MISCELLANEOUS</b>				
3.071	PSG 3.5.16, LI	Application of Ebsco E55 Bituminous Waterproofing Compound (or similar approved) to all earth covered concrete surfaces in accordance with the manufacturer's instructions	m <sup>2</sup>	112		
		<b>FILTERS / TREATMENT WORKS BUILDING AND PLATFORMS</b>				
	<b>SANS1200 G</b>	<b>CONCRETE ( STRUCTURAL )</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.1</b>	<b>Rough</b>				
		<i>Plane vertical to:</i>				
3.072		Sides of Foundation Slabs & Strip Footings	m <sup>2</sup>	87		
	<b>8.2.2</b>	<b>Smooth</b>				
		<i>Plane vertical to:</i>				
3.073		Clearwater channel walls	m <sup>2</sup>	117		
3.074		Sides of exposed clearwater channel slabs	m <sup>2</sup>	6		
3.075		Upstand beams to roof slab	m <sup>2</sup>	44		
3.076		Filter walls	m <sup>2</sup>	563		
3.077		Sides of exposed filter slabs	m <sup>2</sup>	14		
3.078		Sides of RC Staircase	m <sup>2</sup>	22		
3.079		Backwash tank walls	m <sup>2</sup>	312		
3.080		Sides of exposed backwash tank slabs	m <sup>2</sup>	6		
3.081		Sides of Ramps	m <sup>2</sup>	11		
3.082		Sides of Ramp Columns	m <sup>2</sup>	7		
		<i>Plane horizontal to:</i>				
3.083		Soffit of treatment works building 1st Fl slab	m <sup>2</sup>	248		
3.084		Soffit of treatment works building roof slab	m <sup>2</sup>	286		
3.085		Soffits of filter slabs	m <sup>2</sup>	88		
3.086		Soffit of Ramps	m <sup>2</sup>	66		
3.087		Soffits of backwash tank slabs	m <sup>2</sup>	57		
3.088		Soffit of RC Staircase	m <sup>2</sup>	66		
3.089		Soffit of CW Channel Slab	m <sup>2</sup>	19		
	<b>8.2.5</b>	<b>Narrow widths (smooth)</b>				
3.090		Over 100 mm and up to 200 mm	m	66		
3.091		Over 200 mm and up to 300 mm	m	114		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.2.6</b>	<b>Box out holes / form voids</b>				
		<i>Small, area up to and including 0,1 m<sup>2</sup> for the following depths:</i>				
3.092		Up to and including 0.5 m	No.	6		
		<i>Large, area up to and including 0,5 m<sup>2</sup> for the following depths:</i>				
3.093		Up to and including 0.5 m	No.	9		
		<i>Large, area up to and including 1 m<sup>2</sup> for the following depths:</i>				
3.094		Up to and including 0.5 m	No.	3		
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>Mild steel bars</b>				
		<i>Treatment works building</i>				
3.095		8 mm dia	ton	1		
		<i>Filters</i>				
3.096		8 mm dia	ton	1		
		<i>Backwash Tank</i>				
3.097		8 mm dia	ton	1		
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
		<i>Treatment works building</i>				
3.098		10 mm dia	ton	3		
3.099		12 mm dia	ton	5		
3.100		16 mm dia	ton	13		
3.101		16 mm dia	ton	6		
		<i>Filters</i>				
3.102		10 mm dia	ton	2		
3.103		12 mm dia	ton	3		
3.104		16 mm dia	ton	8		
3.105		20 mm dia	ton	4		
		<i>Backwash tank</i>				
3.106		10 mm dia	ton	2		
3.107		12 mm dia	ton	2		
3.108		16 mm dia	ton	5		
3.109		20 mm dia	ton	3		
	<b>8.3.2</b>	<b>High-Tensile Welded Mesh</b>				
		<i>Treatment works building</i>				
3.110		Mesh Ref 395 (6m x 2.4m sheets)	m <sup>2</sup>	160		
		<i>Platforms</i>				
3.111		Mesh Ref 395 (6m x 2.4m sheets)	m <sup>2</sup>	550		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
		<i>Treatment works building</i>				
3.112		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	170		
		<i>Filters</i>				
3.113		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	150		
		<i>Backwash tank</i>				
3.114		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	75		
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<i>Treatment works building</i>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.115		Floor slabs	m <sup>3</sup>	40		
3.116		Walls	m <sup>3</sup>	16		
3.117		Suspended slabs	m <sup>3</sup>	120		
3.118		Staircases	m <sup>3</sup>	10		
3.119		Upstand beams to roof slab	m <sup>3</sup>	13		
3.120		Ramps	m <sup>3</sup>	22		
3.121		Ramp Foundations	m <sup>3</sup>	10		
3.122		Ramp Columns	m <sup>3</sup>	2		
3.123		Strip Footings	m <sup>3</sup>	25		
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.124		Walls	m <sup>3</sup>	12		
3.125		Clearwater Channel Slab	m <sup>3</sup>	7		
		<b>Filters</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.126		Foundation slab	m <sup>3</sup>	20		
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.127	PE 8.1	Floor slabs	m <sup>3</sup>	40		
3.128		Walls	m <sup>3</sup>	75		
3.129		Suspended slabs	m <sup>3</sup>	22		
3.130	PE 8.1	Supply and install filter nozzles complete with sleeves in accordance with the specification	No.	1600		
		<b>Backwash tank</b>				
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.131		Foundation slab	m <sup>3</sup>	50		
3.132		Walls	m <sup>3</sup>	45		
3.133		Suspended slabs	m <sup>3</sup>	25		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>Platforms</b>				
		<i>Grade 25 MPa /19 mm concrete to:</i>				
3.134		Surface Beds (150mm) around sedimentation tank and treatment works building floor as detailed on Drawing No. 316WS-S04	m <sup>3</sup>	75		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<b>Treatment works building</b>				
		<i>Wood-floated finishes to:</i>				
3.135		Horizontal surfaces	m <sup>2</sup>	150		
		<i>Steel-floated finishes to:</i>				
3.136		Horizontal surfaces	m <sup>2</sup>	650		
		<b>Filters</b>				
		<i>Steel-floated finishes to:</i>				
3.137		Horizontal surfaces	m <sup>2</sup>	250		
		<b>Backwash tank</b>				
		<i>Steel-floated finishes to:</i>				
3.138		Horizontal surfaces	m <sup>2</sup>	130		
		<b>Platforms</b>				
		<i>Wood-floated finishes to:</i>				
3.139		Surface bed around sedimentation tank	m <sup>2</sup>	250		
3.140		Surface bed outside treatment works building	m <sup>2</sup>	250		
		<i>Steel-floated finishes to:</i>				
3.141		Surface bed inside treatment works building	m <sup>2</sup>	180		
	<b>8.5, PSG 3.5.4, PSG 3.5.15</b>	<b>JOINTS</b>				
		<b>Designated joints as detailed on Drawing No. 316WS-S.04</b>				
		<b>Filters</b>				
3.142		Joint Type F (Drawing No. S04)	m	150		
3.143		Joint Type R (Drawing No. S04)	m	160		
		<b>Backwash tank</b>				
3.144		Joint Type F (Drawing No. S04)	m	100		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>SANS1200 HA</b>	<b>STRUCTURAL STEELWORK (Sundry items)</b>				
	<b>8.3.1</b>	<b>Supply all material and install complete</b>				
		<i>Frames / supports for banded grid flooring in treatment works building:</i>				
3.145		Gripweld B60-40 Mentis Grating Floor (52m <sup>2</sup> ) on 14 No. x IPE160 x5.1m & 2 No. 100 x 8 Channels x 5.1m as detailed on Drawing No. S02	m <sup>2</sup>	75		
		Mentis 40x3 Rectagrid RS40 Flooring	m <sup>2</sup>	25		
		65x50x6L angle recessed into channel reinforced concrete walls	m	45		
		<i>Handrails To Staircases &amp; Ramps:</i>				
3.146		Mentis Inter - Link Handrailing System	m	150		
3.147		3.5m high internal ladder (hot-dip galvanised mild steel) complete including grab bars as per Drawing No. 316WS-C.14	No.	1		
		<i>Ladders:</i>				
		2.2m high internal ladder (hot-dip galvanised mild steel) complete including grab bars as per Drawing No. 316WS-C.14	No.	1		
		<i>Weir plates:</i>				
3.148		Supply and install stainless steel filter splitter weir plate in accordance with the details on Drawing No. 316WS-C.03	No.	1		
		<i>Manhole hatches:</i>				
3.149		GRP manhole hatch (Mosden or similar) 1000 x 1000mm in chlorine vacuum room	No.	1		
3.150		600mm diameter light duty pre-cast concrete manhole lid and frame in workshop	No.	1		
		<i>Crawl beam:</i>				
3.151	PE 7	Lifting beam, 2T electrical hoist with lift and crawl capability and spreader beam	Sum	1		
	<b>SANS1200 G</b>	<b>TESTING</b>				
3.152	PSG 3.5.8	Carry out watertightness testing of filters	No.	1		
3.153	PSG 3.5.8	Carry out watertightness testing of backwash tank	No.	1		
3.154	PE 8.2	Carry out testing of filters (4 No.) in accordance with the specification	Sum	1		
3.155	PSG 3.5.8.3	Carry out disinfection of filters	No.	1		
3.156	PSG 3.5.8.3	Carry out disinfection of backwash tank	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>MISCELLANEOUS</b>				
3.157	PSG 3.5.16, LI	Application of Ebsco E55 Bituminous Waterproofing Compound (or similar approved) to all earth covered concrete surfaces in accordance with the manufacturer's instructions	m <sup>2</sup>	180		
3.158	PE 8.3	Supply and installation of media for rapid gravity sand filters as per specification	m <sup>3</sup>	120		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CLEARWATER RESERVOIR</b>				
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.1</b>	<b>Rough</b>				
		<i>Curved vertical to:</i>				
3.159		Walls	m <sup>2</sup>	80		
3.160		Sides of floor slabs and footings	m <sup>2</sup>	200		
		<i>Plane vertical to:</i>				
3.161		Walls	m <sup>2</sup>	15.0		
3.162		Sides of floor slabs and footings	m <sup>2</sup>	50		
	<b>8.2.2</b>	<b>Smooth</b>				
		<i>Curved vertical to:</i>				
3.163		Sides of columns	m <sup>2</sup>	110.0		
3.164		Walls	m <sup>2</sup>	1400		
3.165		Upstand Beam To Roof	m <sup>2</sup>	110		
		<i>Plane vertical to:</i>				
3.166		Sides of column drops	m <sup>2</sup>	35		
3.167		Sides of column bases	m <sup>2</sup>	40.0		
		<i>Plane horizontal to:</i>				
3.168		Soffits of roof slabs	m <sup>2</sup>	1200		
3.169		Soffit of upstand beam:	m <sup>2</sup>	85		
	<b>8.2.5</b>	<b>Narrow widths (smooth)</b>				
3.170		Over 200 mm and up to 300 mm	m	65		
	<b>8.2.6</b>	<b>Box out holes / form voids</b>				
		<i>Small, area up to and including 0,1 m<sup>2</sup> for the following depths:</i>				
3.171		Up to and including 0.5 m	No.	3		
		<i>Large, area up to and including 0,5 m<sup>2</sup> for the following depths:</i>				
3.172		Up to and including 0.5 m	No.	1		
		<i>Large, area up to and including 1 m<sup>2</sup> for the following depths:</i>				
3.173		Up to and including 0.5 m	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>Mild steel bars</b>				
3.174		8 mm dia	ton	1		
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
3.175		10 mm dia	ton	2		
3.176		12 mm dia	ton	2		
3.177		16 mm dia & greater	ton	2		
	<b>8.3.2</b>	<b>High-Tensile Welded Mesh</b>				
3.178		Mesh Ref 395 (6m x 2.4m sheets) in Floor	m <sup>2</sup>	800		
3.179		Mesh Ref 617 (6m x 2.4m sheets) in Floor	m <sup>2</sup>	800		
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
3.180		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	950		
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.181		Footings	m <sup>3</sup>	60		
		<i>Grade 35 MPa /19 mm concrete (water tight) to:</i>				
3.182		Floor slabs	m <sup>3</sup>	300		
3.183		Columns	m <sup>3</sup>	40		
3.184		Walls	m <sup>3</sup>	200		
3.185		Upstand Beam To Roof	m <sup>3</sup>	60		
3.186		Suspended slabs	m <sup>3</sup>	230		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<i>Wood-floated finishes to:</i>				
3.187		Horizontal surfaces	m <sup>2</sup>	160		
		<i>Steel-floated finishes to:</i>				
3.188		Narrow surfaces up to 350 mm wide	m	180		
3.189		Horizontal surfaces	m <sup>2</sup>	1800		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>8.5, PSG 3.5.4, PSG 3.5.15</b>	<b>JOINTS</b>				
		<b>Designated joints as detailed on Drawing No. 316WS-S.04</b>				
3.190		Joint Type D	m	110		
3.191		Joint Type B	m	180		
3.192		Joint Type E	m	60		
3.193		Joint Type F	m	250		
		<b>UNDERDRAINAGE SYSTEM</b>				
		Nominal 120 mm thick filter bed - no fines concrete including 20 mm thick mortar skim				
3.194		on inclined founding surfaces	m <sup>2</sup>	843		
3.195	SANS1200 LE, LI	Construct drain complete including excavation, 19 mm stone fill, geofabric blanket and 110mm dia. perforated flexible drainage pipe as shown on drawings	m	200		
	<b>SANS1200 HA</b>	<b>STRUCTURAL STEELWORK (Sundry items)</b>				
	<b>8.3.1</b>	<b>Supply all material and install complete</b>				
3.196		Internal access ladder - Ladder fabricated from Aluminium - 65x10mm Flat Stringers & 20mm round bar rungs - Height = 5.8m (see Drawing No. 316WS-C.14)	No.	1		
3.197		External Access Ladder - Structural Steel Catladder fabricated from hot dipped galvanized mild steel 65x10mm Flat Stringers & 20mm Dia round bar rungs, & 50x8mm Flat Hoops & Verticals. Height = 7.2m (see Drawing No. 316WS-C.14)	No.	1		
3.198		GRP manhole hatch (Mosden or similar) 1200x850mm	No.	2		
3.199		Supply & install 100mm dia full bore rainwater drains through reservoir roof perimeter upstand, complete as detailed on Drawing No.316WS-S.03	No.	6		
3.200		Supply & install 150mm dia. galvanized vent pipes as detailed on Drawing 316WS-S.03	No.	4		
	<b>SANS1200 G</b>	<b>WATERTIGHTNESS TESTING</b>				
3.201	PSG 3.5.8	Carry out watertightness testing of structure	No.	1		
3.202	PSG 3.5.8.3	Carry out disinfection of structure	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>MISCELLANEOUS</b>				
3.203	PSG 3.5.16, LI	Application of Ebsco E55 Bituminous Waterproofing Compound (or similar approved) to all earth covered concrete surfaces in accordance with the manufacturer's instructions	m <sup>2</sup>	210		
3.204		19mm Crushed Stone to Reservoir Roof Slab (50mm Thick)	m <sup>3</sup>	75		
		<b>GUARD HOUSE</b>				
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.1</b>	<b>Rough</b>				
		<i>Vertical to:</i>				
3.205		Strip footings	m <sup>2</sup>	15		
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
3.206		10 mm dia	ton	2		
3.207		12 mm dia	ton	2		
	<b>8.3.2</b>	<b>High-Tensile Welded Mesh</b>				
3.208		Mesh Ref 193 (6m x 2.4m sheets)	m <sup>2</sup>	20		
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
3.209		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	30		
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<i>Grade 25 MPa / 19 mm concrete to:</i>				
3.210		Footings	m <sup>3</sup>	30		
3.211		Surface Bed	m <sup>3</sup>	20		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<i>Wood-floated finishes to:</i>				
3.212		Horizontal surfaces	m <sup>2</sup>	15		
		<i>Steel-floated finishes to:</i>				
3.213		Horizontal surfaces	m <sup>2</sup>	15		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CHAMBERS</b>				
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2, PSG 2.1, PSG 3.2</b>	<b>SCHEDULED FORMWORK ITEMS</b>				
	<b>8.2.1</b>	<b>Rough</b>				
		<i>Vertical to:</i>				
3.214		Foundation slab - control valve chamber	m <sup>2</sup>	20		
3.215		Foundation slab - outlet chamber	m <sup>2</sup>	20		
3.216		Foundation slab - scour chamber	m <sup>2</sup>	20		
3.217		Foundation slab - domestic tank chamber	m <sup>2</sup>	15		
	<b>8.2.2</b>	<b>Smooth</b>				
		<i>Plane horizontal to:</i>				
3.218		Soffits of slabs - control valve chamber	m <sup>2</sup>	15		
3.219		Soffits of slabs - outlet chamber	m <sup>2</sup>	15		
3.220		Soffits of slabs - scour chamber	m <sup>2</sup>	10		
3.221		Soffits of slabs - domestic tank chamber	m <sup>2</sup>	5		
		<i>Plane vertical to:</i>				
3.222		Walls - control valve chamber	m <sup>2</sup>	85		
3.223		Walls - outlet chamber	m <sup>2</sup>	85		
3.224		Walls - scour chamber	m <sup>2</sup>	100		
3.225		Walls - domestic tank chamber	m <sup>2</sup>	50		
	<b>8.1.2, 8.3, PSG 5.1.1</b>	<b>SCHEDULED REINFORCEMENT ITEMS</b>				
	<b>8.3.1, PSG 5.1.3.1</b>	<b>Mild steel bars</b>				
3.226		8 mm dia - control valve chamber	ton	1		
3.227		8 mm dia - outlet chamber	ton	1		
3.228		8 mm dia - scour chamber	ton	1		
3.229		8 mm dia - domestic tank chamber	ton	1		
	<b>8.3.1, PSG 5.1.3.1</b>	<b>High-tensile steel bars</b>				
		<b>Control valve chamber</b>				
3.230		10 mm dia	ton	1		
3.231		12 mm dia	ton	1		
3.232		16 mm dia	ton	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>Outlet chamber</b>				
3.233		10 mm dia	ton	1		
3.234		12 mm dia	ton	1		
3.235		16 mm dia	ton	1		
		<b>Scour chamber</b>				
3.236		10 mm dia	ton	1		
3.237		12 mm dia	ton	1		
3.238		16 mm dia	ton	2		
		<b>Domestic tank chamber</b>				
3.239		10 mm dia	ton	1		
3.240		12 mm dia	ton	1		
3.241		16 mm dia	ton	1		
	<b>8.4, PSG 3.5</b>	<b>SCHEDULED CONCRETE ITEMS</b>				
	<b>PSG 3.5.3.3</b>	<b>Blinding Layer</b>				
		<b>Control valve chamber</b>				
3.242		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	12		
		<b>Outlet chamber</b>				
3.243		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	12		
		<b>Scour chamber</b>				
3.244		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	11		
		<b>Domestic tank chamber</b>				
3.245		75 mm thick blinding layer (15MPa / 19mm)	m <sup>2</sup>	6		
	<b>8.4.3, PSG 5.1.2</b>	<b>Strength concrete</b>				
		<b>Control valve chamber</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.246		Footings	m <sup>3</sup>	4		
3.247		Walls	m <sup>3</sup>	12		
3.248		Suspended slabs	m <sup>3</sup>	3		
		<b>Outlet chamber</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.249		Footings	m <sup>3</sup>	5		
3.250		Walls	m <sup>3</sup>	13		
3.251		Suspended slabs	m <sup>3</sup>	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>Scour chamber</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.252		Footings	m <sup>3</sup>	5		
3.253		Walls	m <sup>3</sup>	17		
3.254		Suspended slabs	m <sup>3</sup>	4		
		<b>Domestic tank chamber</b>				
		<i>Grade 35 MPa /19 mm concrete to:</i>				
3.255		Footings	m <sup>3</sup>	3		
3.256		Walls	m <sup>3</sup>	10		
3.257		Suspended slabs	m <sup>3</sup>	2		
	<b>8.4.4, PSG 3.5.7</b>	<b>Unformed surface finishes</b>				
		<i>Wood-floated finishes to:</i>				
3.258		Horizontal surfaces - control valve chamber	m <sup>2</sup>	12		
3.259		Horizontal surfaces - outlet chamber	m <sup>2</sup>	12		
3.260		Horizontal surfaces - scour chamber	m <sup>2</sup>	11		
3.261		Horizontal surfaces - domestic tank chamber	m <sup>2</sup>	6		
		<i>Steel-floated finishes to:</i>				
3.262		Horizontal surfaces - control valve chamber	m <sup>2</sup>	12		
3.263		Horizontal surfaces - outlet chamber	m <sup>2</sup>	12		
3.264		Horizontal surfaces - scour chamber	m <sup>2</sup>	11		
3.265		Horizontal surfaces - domestic tank chamber	m <sup>2</sup>	6		
	<b>SANS1200 HA</b>	<b>STRUCTURAL STEELWORK (Sundry items)</b>				
	<b>8.3.1</b>	<b>Supply all material and install complete</b>				
		<i>Access ladders / Manhole hatches:</i>				
3.266		2m high internal ladder (hot-dip galvanised mild steel) complete including grab bars as per Drawing No. 316WS-C.14	No.	3		
3.267		1.5m high internal ladder (hot-dip galvanised mild steel) complete including grab bars as per Drawing No. 316WS-C.14	No.	1		
3.268		Manhole hatch as detailed on Drawing No. 316WS-C.13	No.	6		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**SCHEDULE OF QUANTITIES**  
**SECTION 4: PIPELINES**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 4: PIPELINES</b>				
	<b>SANS1200 DB</b>	<b>EARTHWORKS (PIPE TRENCHES)</b>				
	<b>8.3.1</b>	<b>Site Clearance and Removal of Topsoil</b>				
4.001	8.3.1 a), LI	Clear and grub vegetation in strip 2m wide along pipe route. Rate to include for removal of trees of girth up to and including 1m	m	51		
4.002	8.3.1 c), LI	Remove topsoil to trench width and a depth of 150mm, stockpile, maintain and replace once trench has been backfilled	m	51		
	<b>8.3.2</b>	<b>Excavation</b>				
	<b>8.3.2 a), PSD 2.1, LI</b>	<b>Excavate in all materials for trenches, backfill, compact and dispose of surplus / unsuitable material, for pipes:</b>				
		<i>Up to and including 110 mm diam for trench depth:</i>				
4.003		Exceeding 0,0 m but not exceeding 1,0m	m	178		
4.004		Exceeding 1,0 m but not exceeding 1,5 m	m	45		
		<i>Over 110 mm diam for trench depth:</i>				
4.005		Exceeding 0,0 m but not exceeding 1,0m	m	51		
4.006		Exceeding 1,0 m but not exceeding 1,5 m	m	13		
	<b>8.3.2 b)</b>	<b>Extra over items 4.003 to 4.006 for:</b>				
4.007		Hard rock excavation	m <sup>3</sup>	71		
4.008		Boulder excavation (Classes A and B)	m <sup>3</sup>	36		
	<b>SANS1200 LB</b>	<b>BEDDING</b>				
	<b>PSLB 4.1.1</b>	<b>Provision of bedding from commercial sources (Provisional)</b>				
4.009	8.2.2.3 a)	Selected granular material	m <sup>3</sup>	25		
4.010	8.2.2.3 b)	Selected fill material	m <sup>3</sup>	25		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>SANS 1200 L</b>	<b>MEDIUM-PRESSURE PIPELINES</b>				
		<b>RAW WATER RISING MAIN</b>				
	<b>8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC, PH</b>	<b>Supply, handle, lay, test and disinfect above ground steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.011		250 mm	m	80		
		<b>SEDIMENTATION TANK SUPPLY PIPELINES</b>				
	<b>8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC, PH</b>	<b>Supply, handle, lay, test and disinfect above ground steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.012		150 mm	m	35		
4.013		250 mm	m	10		
		<b>FILTER SUPPLY PIPELINES</b>				
	<b>8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC, PH</b>	<b>Supply, handle, lay, test and disinfect above ground steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.014		250 mm	m	85		
	<b>8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC</b>	<b>Supply, handle, lay, bed, test and disinfect buried steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising in accordance with the specifications.</b>				
4.015		250 mm	m	55		
		<b>CLEARWATER PIPELINE TO RESERVOIR</b>				
	<b>8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC, PH</b>	<b>Supply, handle, lay, test and disinfect above ground steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.016		250 mm	m	20		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>BACKWASH AND WASTEWATER PIPELINES</b>				
	8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC, PH	Supply, handle, lay, test and disinfect above ground steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising and painting in accordance with the specifications.				
4.017		250 mm	m	100		
	8.2.1, PSL 2.1, PSL 2.3, PSL 2.4, PC	Supply, handle, lay, bed, test and disinfect buried steel pipes to SANS 719:2011 of the following diameters. Pipes to be flanged to SANS 1123 Table 1600/3. Rate to include for galvanising in accordance with the specifications.				
4.018		100 mm	m	12		
4.019		250 mm	m	18		
		<b>DOMESTIC WATER SUPPLY RISING MAIN</b>				
	8.2.1, PSL 2.2.2, PSL 3.1.1.1	Supply, handle, lay, bed, test and disinfect HDPE PE63 PN10 pipes to SANS ISO 4427 of the following diameters:				
4.020		75 mm	m	80		
		<b>DOMESTIC WATER SUPPLY GRAVITY MAINS</b>				
	8.2.1, PSL 2.2.2, PSL 3.1.1.1	Supply, handle, lay, bed, test and disinfect HDPE PE63 PN12 pipes to SANS ISO 4427 of the following diameters:				
4.021		75 mm	m	2100		
4.022		90 mm	m	1300		
4.023		110 mm	m	640		
4.024		160 mm	m	227		
	8.2.2, PC	<b>Specials and fittings</b>				
		<i>Extra over items 4.011 to 4.019 for supplying, bedding, jointing, testing and disinfecting the following fittings and specials complete. Cutting of pipes and fittings included:</i>				
		<b>100mm Ø Steel medium-radius bends flanged to SANS 1123 Table 1600/3</b>				
4.025		11.25°	No.	1		
4.026		22.5°	No.	1		
4.027		45°	No.	1		
4.028		90°	No.	1		
		<b>150mm Ø Steel medium-radius bends flanged to SANS 1123 Table 1600/3</b>				
4.029		11.25°	No.	1		
4.030		22.5°	No.	1		
4.031		45°	No.	2		
4.032		90°	No.	2		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>250mm Ø Steel medium-radius bends flanged to SANS 1123 Table 1600/3</b>				
4.033		11.25°	No.	6		
4.034		22.5°	No.	6		
4.035		45°	No.	6		
4.036		90°	No.	6		
		<b>Steel Equal Tees</b>				
4.037		150 mm Ø MS flanged equal tee	No.	2		
4.038		250 mm Ø MS flanged equal tee	No.	3		
		<b>Steel Reducing Tees</b>				
4.039		250 x 100 mm Ø MS flanged equal tee	No.	2		
		<b>Blank Flanges</b>				
4.040		250 mm Ø MS blank flange	No.	1		
		<b>Flange Adaptors (Viking Johnson or similar approved) of the following diameters:</b>				
4.041		100 mm	No.	2		
4.042		150 mm	No.	2		
4.043		250 mm	No.	15		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>SPLITTER BOX PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install splitter box pipework, fittings and valves as per Drawing No. 316WS-C.02. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.044		Item 1.1 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	2		
4.045		Item 1.2 - 250mm Ø MS 90° flanged bend	No.	4		
4.046		Item 1.3 - 250mm Ø MS straight pipe length, flanged both ends, length = 6000mm F/F	No.	1		
4.047		Item 1.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 730mm F/F	No.	1		
4.048		Item 1.5 - 250mm Ø MS 90° bend flanged one end, plain one end	No.	1		
4.049		Item 1.6 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 125mm from plain end, length = 370mm F/F	No.	1		
4.050		Item 1.7 - 250mm Ø MS straight pipe length, flanged both ends, length = 4500mm F/F	No.	1		
4.051	PB	Item 1.8 - 250mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	1		
4.052		Item 1.9 - 150mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 125mm from plain end, length = 370mm F/F	No.	2		
4.053		Item 1.10 - 150mm Ø MS 90° flanged bend	No.	4		
4.054		Item 1.11 - 150mm Ø MS straight pipe length, flanged both ends, length = 4500mm F/F	No.	2		
4.055	PB	Item 1.12 - 150mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	2		
4.056		Item 1.13 - 150mm Ø Viking Johnson (or similar approved) flange adaptor	No.	2		
		<b>SEDIMENTATION TANK INLET AND OUTLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install sedimentation tank inlet and outlet pipework, fittings and valves as per Drawing No's. 316WS-C.02 and 316WS-C03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.057		Item 2.1 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	3		
4.058		Item 2.2 - 250mm Ø MS 90° flanged bend	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
4.059		Item 2.3 - 250mm Ø MS straight pipe length, flanged both ends, length = 2130mm F/F	No.	2		
4.060		Item 2.4 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 235mm from upstream end, length = 1090mm F/F	No.	1		
4.061		Item 2.5 - 250mm Ø MS straight pipe length, flanged both ends, length = 7900mm F/F	No.	1		
4.062		Item 2.6 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 75mm from plain end, length = 350mm F/F	No.	1		
4.063		Item 2.7 - 250mm Ø MS straight pipe length, flanged both ends, length = 1230mm F/F	No.	1		
<b>SEDIMENTATION TANK DESLUDGING PIPEWORK</b>						
	<b>8.2.5, PC, PH</b>	<b>Supply and install sedimentation tank desludging pipework, fittings and valves as per Drawing No. 316WS-C.02. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.064		Item 3.1 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 160mm from plain end, length = 6890mm F/F	No.	1		
4.065		Item 3.2 - 250mm Ø MS 52° flanged bend	No.	1		
4.066		Item 3.3 - 250mm Ø MS straight pipe length, flanged both ends, length = 3010mm F/F	No.	1		
4.067		Item 3.4 - 250mm Ø MS 60° flanged bend	No.	1		
4.068	PB	Item 3.5 - 250mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	1		
4.069		Item 3.6 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 75mm from plain end, length = 350mm F/F	No.	2		
4.070		Item 3.7 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
<b>FILTER FEED PIPEWORK</b>						
	<b>8.2.5, PC, PH</b>	<b>Supply and install filter feed pipework, fittings and valves as per Drawing No's. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.071		Item 4.1 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 125mm from plain end, length = 335mm F/F	No.	4		
4.072	PB	Item 4.2 - 250mm Ø knife gate valve (wafer type)	No.	4		
4.073		Item 4.3 - 250mm Ø MS 90° flanged bend	No.	4		
4.074		Item 4.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 2500mm F/F	No.	4		
4.075		Item 4.5 - 250mm Ø MS 90° bend flanged one end, plain one end	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>FILTERED WATER OUTLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install filtered water outlet pipework, fittings and valves as per Drawing No's. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.076		Item 5.1 - 200mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 125mm from plain end, length = 1050mm F/F	No.	4		
4.077		Item 5.2 - 200mm Ø MS flanged cross piece	No.	4		
4.078	PB	Item 5.3 - 200mm Ø butterfly valve (wafer type). Valves to be supplied with 5500mm long extended spindles and pedestals.	No.	4		
4.079		Item 5.4 - 200mm Ø MS straight pipe length, flanged both ends, length = 1070mm F/F	No.	4		
4.080		Item 5.5 - 200mm Ø MS 90° flanged bend	No.	4		
4.081		Item 5.6 - 200mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 425mm from plain end, length = 1490mm F/F	No.	4		
		<b>BACKWASH DELIVERY PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash delivery pipework, fittings and valves as per Drawing No's. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.082	PB	Item 6.1 - 200mm Ø butterfly valve (wafer type). Valves to be supplied with 5500mm long extended spindles and pedestals.	No.	4		
4.083		Item 6.2 - 200mm Ø MS 90° flanged bend	No.	12		
4.084		Item 6.3 - 200mm Ø MS flanged tee	No.	6		
4.085		Item 6.4 - 200mm Ø MS straight pipe length, flanged both ends, length = 3485mm F/F	No.	2		
4.086		Item 6.5 - 200mm Ø MS straight pipe length, flanged both ends, length = 1010mm F/F	No.	1		
4.087		Item 6.6 - 200mm Ø MS straight pipe length, flanged both ends, length = 2115mm F/F	No.	1		
4.088		Item 6.7 - 200mm Ø MS straight pipe length, flanged both ends, length = 2620mm F/F	No.	1		
4.089		Item 6.8 - 200mm Ø MS straight pipe length, flanged both ends, length = 540mm F/F	No.	1		
4.090		Item 6.9 - 200mm Ø MS straight pipe length, flanged both ends, length = 1220mm F/F	No.	1		
4.091		Item 6.10 - 200mm Ø MS straight pipe length, flanged both ends, length = 200mm F/F	No.	2		
4.092	PB	Item 6.11 - 200mm Ø wafer single door check valve (AVK IPV Series 6143 or similar approved)	No.	2		
4.093	PB	Item 6.12 - 200mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	2		
4.094		Item 6.13 - 200 x 100mm Ø MS flanged concentric reducer	No.	2		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>BACKWASH SUCTION PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash suction pipework, fittings and valves as per Drawing No's. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.095		Item 7.1 - 250mm Ø MS straight pipe flanged one end, bellmouth one end, length = 1850mm F/F	No.	1		
4.096		Item 7.2 - 250mm Ø MS 90° flanged bend	No.	1		
4.097		Item 7.3 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded centrally, length = 550mm F/F	No.	1		
4.098		Item 7.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 2170mm F/F	No.	1		
4.099		Item 7.5 - 250mm Ø MS flanged equal segmented tee	No.	4		
4.100		Item 7.6 - 250mm Ø MS straight pipe length, flanged both ends, length = 1100mm F/F	No.	3		
4.101		Item 7.7 - 250mm Ø MS straight pipe length, flanged both ends, length = 910mm F/F	No.	3		
4.102	PB	Item 7.8 - 250mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	4		
4.103		Item 7.9 - 250 x 100mm Ø MS flanged eccentric reducer	No.	4		
4.104		Item 7.10 - 250mm Ø MS blank flange	No.	1		
		<b>BACKWASH OUTLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash outlet pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.105		Item 8.1 - 300mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 150mm from plain end, length = 450mm F/F	No.	4		
4.106	PB	Item 8.2 - 300mm Ø knife gate valve (wafer type). Valves to be supplied with 4600mm long extended spindles and pedestals.	No.	4		
4.107		Item 8.3 - 300 Ø MS flanged equal tee	No.	4		
4.108		Item 8.4 - 300mm Ø MS straight pipe length, flanged both ends, length = 3230mm F/F	No.	3		
4.109		Item 8.5 - 300mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 255mm from downstream end, length = 1870mm F/F	No.	1		
4.110		Item 8.6 - 300mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
4.111		Item 8.7 - 300mm Ø MS blank flange	No.	1		
		<b>SUB - TOTAL CARRIED FORWARD</b>				

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>PLENARY FLOOR ACCESS PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install plenary floor access pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.112		Item 9.1 - 600mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 150mm from plain end, length = 400mm F/F	No.	4		
4.113		Item 9.2 - 600mm Ø MS blank flange	No.	4		
		<b>AIR DELIVERY PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install air delivery pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.114	PB	Item 10.1 - 200mm Ø butterfly valve (wafer type). Valves to be supplied with 5500mm long extended spindles and pedestals.	No.	4		
4.115		Item 10.2 - 200 x 100mm Ø MS flanged concentric reducer	No.	4		
4.116		Item 10.3 - 100mm Ø MS 90° flanged bend	No.	13		
4.117		Item 10.4 - 100mm Ø MS straight pipe length, flanged both ends, length = 320mm F/F	No.	4		
4.118		Item 10.5 - 100mm Ø MS straight pipe length, flanged both ends, length = 3785mm F/F	No.	4		
4.119		Item 10.6 - 100mm Ø MS flanged equal tee	No.	4		
4.120		Item 10.7 - 100mm Ø MS straight pipe length, flanged both ends, length = 7645mm F/F	No.	1		
4.121		Item 10.8 - 100mm Ø MS straight pipe length, flanged both ends, length = 2955mm F/F	No.	1		
4.122		Item 10.9 - 100mm Ø MS straight pipe length, flanged both ends, length = 440mm F/F	No.	2		
4.123	PB	Item 10.10 - 100mm Ø wafer single door check valve (AVK IPV Series 6143 or similar approved)	No.	2		
4.124		Item 10.11 - 100mm Ø MS straight pipe length, flanged both ends, length = 150mm F/F	No.	4		
4.125	PB	Item 10.12 - 100mm Ø butterfly valve (wafer type)	No.	2		
4.126		Item 10.13 - 100mm Ø MS straight pipe length, flanged both ends, length = 3540mm F/F	No.	3		
4.127		Item 10.14 - 100mm Ø MS straight pipe length, flanged both ends, length = 1840mm F/F	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>BACKWASH TANK CLEARWATER OUTLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash tank clearwater outlet pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.128		Item 11.1 - 250mm Ø MS straight pipe flanged one end, bellmouth one end, length = 327mm F/F	No.	1		
4.129		Item 11.2 - 250mm Ø MS 90° flanged bend	No.	3		
4.130		Item 11.3 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded centrally, length = 550mm F/F	No.	1		
4.131		Item 11.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 500mm F/F	No.	1		
4.132		Item 11.5 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
		<b>BACKWASH TANK OVERFLOW PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash tank overflow pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.133		Item 12.1 - 250mm Ø MS straight pipe flanged one end, bellmouth one end, length = 1265mm F/F	No.	1		
4.134		Item 12.2 - 250mm Ø MS 90° flanged bend	No.	3		
4.135		Item 12.3 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded centrally, length = 550mm F/F	No.	1		
4.136		Item 12.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 500mm F/F	No.	1		
4.137		Item 12.5 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
		<b>BACKWASH TANK SCOUR PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install backwash tank scour pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.138		Item 13.1 - 100mm Ø MS straight pipe flanged one end, plain one end, with puddle flange welded approx. 125mm from plain end, length = 550mm F/F	No.	1		
4.139	PB	Item 13.2 - 100mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	1		
4.140		Item 13.3 - 100mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>PIPE GALLERY DRAIN PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install pipe gallery drain pipework, fittings and valves as per Drawing No. 316WS-C.03. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.141		Item 14.1 - 100mm Ø MS straight pipe flanged one end, plain one end, with puddle flange welded approx. 125mm from plain end, length = 550mm F/F	No.	1		
4.142	PB	Item 14.2 - 100mm Ø wafer single door check valve (AVK IPV Series 6143 or similar approved)	No.	1		
4.143		Item 14.3 - 100mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
		<b>BACKWASH TANK AIR VENTS</b>				
	<b>8.2.5, PC</b>	<b>Supply and install backwash tank air vents as per Drawing No. 316WS-C.03. Rate to include for galvanising in accordance with the specifications.</b>				
4.144		Item 15.1 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded centrally, length = 505mm F/F	No.	2		
4.145		Item 15.2 - 250mm Ø MS 90° flanged bend with mesh bolted onto open end	No.	2		
		<b>RAW WATER RISING MAIN INLET CHAMBER PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install raw water rising main inlet chamber pipework, fittings and valves as per Drawing No. 316WS-C.02. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.146		Item 16.1 - 250mm Ø MS blank flange	No.	1		
4.147		Item 16.2 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded centrally, length = 1025mm F/F	No.	1		
4.148		Item 16.3 - 250mm Ø Elster Kent Helix H4000 flanged water meter	No.	1		
4.149		Item 16.4 - 250mm Ø MS straight pipe length, flanged both ends, approx. length = 1638mm F/F	No.	1		
4.150	PB	Item 16.5 - 250mm Ø AVK Series 43/60 (or similar approved) Class 16 flanged resilient seal gate valve with handwheel and non-rising spindle	No.	1		
4.151		Item 16.6 - 250mm Ø Viking Johnson (or similar approved) dismantling joint	No.	1		
4.152		Item 16.7 - 250mm Ø MS straight pipe length, flanged both ends, length = 825mm F/F	No.	1		
		<b>SUB - TOTAL CARRIED FORWARD</b>				



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CLEARWATER RESERVOIR INLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install clearwater reservoir inlet pipework, fittings and valves as per Drawing No. 316WS-C.04. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.153		Item 17.2 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
4.154	PB	Item 17.3 - 250mm Ø Class 16 flanged resilient seal gate valve (AVK Series 43/60 or similar approved) with non-rising spindle	No.	1		
4.155		Item 17.4 - 250mm Ø MS straight pipe length, flanged both ends, length = 725mm F/F	No.	1		
4.156		Item 17.5 - 250mm Ø MS 90° flanged elbow	No.	2		
4.157		Item 17.6 - 250mm Ø MS straight pipe length, flanged both ends, length = 5500mm F/F	No.	1		
4.158		Item 17.7 - 250mm Ø MS straight pipe flanged one ends, plain one end, with puddle flange welded approx. 475mm from upstream end, length = 700mm F/F	No.	1		
		<b>CLEARWATER RESERVOIR OUTLET PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install clearwater reservoir outlet pipework, fittings and valves as per Drawing No. 316WS-C.05. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.159		Item 18.1 - 250mm Ø MS straight pipe flanged on end, plain one end with puddle flange welded approx. 325mm from plain end, length = 1400mm F/F	No.	1		
4.160		Item 18.2 - 250mm Ø MS 90° flanged elbow	No.	1		
4.161		Item 18.3 - 250mm Ø MS straight pipe length, flanged both ends, length = 2500mm F/F	No.	1		
4.162		Item 18.4 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 1000mm from plain end, length = 1400mm F/F	No.	1		
4.163		Item 18.5 - 250mm Ø Viking Johnson (or similar approved) dismantling joint	No.	1		
4.164	PB	Item 18.6 - 250mm Ø AVK Series 43/60 (or similar approved) Class 16 flanged resilient seal gate valve with handwheel and non-rising spindle	No.	1		
4.165		Item 18.7 - 250mm Ø MS straight pipe length, flanged both ends, length = 1635mm F/F	No.	1		
4.166		Item 18.8 - 250mm Ø Elster Kent Helix H4000 flanged water meter	No.	1		
4.167		Item 18.9 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 528mm from upstream end, length = 1000mm F/F	No.	1		
4.168		Item 18.10 - 250mm Ø MS blank flange	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CLEARWATER RESERVOIR OVERFLOW PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install clearwater reservoir overflow pipework, fittings and valves as per Drawing No. 316WS-C.04. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.169		Item 19.1 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 300mm from plain end, length = 875mm F/F	No.	1		
4.170		Item 19.2 - 250mm Ø MS 90° flanged elbow	No.	3		
4.171		Item 19.3 - 250mm Ø MS straight pipe length, flanged both ends, approx. length = 5212mm F/F	No.	1		
4.172		Item 19.4 - 250mm Ø MS straight pipe length, flanged both ends, approx. length = 2706.5mm F/F	No.	1		
4.173		Item 19.5 - 250mm Ø MS straight pipe length, flanged both ends, approx. length = 915mm F/F	No.	1		
		<b>CLEARWATER RESERVOIR SCOUR PIPEWORK</b>				
	<b>8.2.5, PC, PH</b>	<b>Supply and install clearwater reservoir scour pipework, fittings and valves as per Drawing No. 316WS-C.05. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.174		Item 20.1 - 250mm Ø MS straight pipe flanged one end, plain one end with puddle flange welded approx. 150mm from plain end, length = 800mm F/F	No.	1		
4.175		Item 20.2 - 250mm Ø MS straight pipe length, flanged both ends, length = 14947.5mm F/F	No.	1		
4.176		Item 20.3 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded centrally, length = 1000mm F/F	No.	1		
4.177		Item 20.4 - 250mm Ø Viking Johnson (or similar approved) dismantling joint	No.	1		
4.178	PB	Item 20.5 - 250mm Ø AVK Series 37/50 (or similar approved) Class 16 flanged wedge gate valve with handwheel and non-rising spindle	No.	1		
4.179		Item 20.6 - 250mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 864mm from upstream end, length = 1200mm F/F	No.	1		
4.180		Item 20.7 - 250mm Ø MS equal tee (flanged)	No.	1		
4.181		Item 20.8 - 250mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
		<b>SUB - TOTAL CARRIED FORWARD</b>				

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
SUB - TOTAL BROUGHT FORWARD						
		<b>DOMESTIC WATER SUPPLY TANK INLET PIPEWORK</b>				
	8.2.5, PC, PH	<b>Supply and install domestic water supply tank inlet pipework, fittings and valves as per Drawing No. 316WS-C.06. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.182		Item 21.2 - 80mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
4.183		Item 21.3 - 80 x 50mm Ø MS steel reducer (flanged)	No.	1		
4.184		Item 21.4 - 50mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 422mm from upstream end, length = 1000mm F/F	No.	1		
4.185		Item 21.5 - 50mm Ø Viking Johnson (or similar approved) dismantling joint	No.	2		
4.186	PB	Item 21.6 - 50mm Ø AVK Series 43/60 (or similar approved) Class 16 flanged resilient seal gate valve with handwheel and non-rising spindle	No.	2		
4.187		Item 21.7 - 50mm Ø MS straight pipe length, flanged both ends, length = 250mm F/F	No.	1		
4.188		Item 21.8 - 50mm Ø Elster Kent Helix H4000 flanged water meter	No.	1		
4.189		Item 21.9 - 50mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 578mm from upstream end, length = 1000mm F/F	No.	1		
4.190		Item 21.10 - 50mm Ø MS 90° flanged elbow	No.	4		
4.191		Item 21.11 - 50mm Ø MS straight pipe length, flanged both ends, length = 1000mm F/F	No.	1		
4.192		Item 21.12 - 50mm Ø MS straight pipe length, flanged both ends, approx. length = 1381mm F/F	No.	1		
4.193		Item 21.13 - 50mm Ø MS blank flange drilled and fitted with 40mm Ø BSP female thread	No.	1		
4.194		Item 21.14 - 40mm Ø PVC tank adaptor	No.	1		
4.195		Item 21.15 - 40mm Ø Cobra (or similar approved) brass float valve	No.	1		
SUB - TOTAL CARRIED FORWARD						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
<b>DOMESTIC WATER SUPPLY TANK OUTLET PIPEWORK</b>						
	8.2.5, PC, PH	<b>Supply and install domestic water supply tank outlet pipework, fittings and valves as per Drawing No. 316WS-C.07. Rate to include for galvanising and painting in accordance with the specifications.</b>				
4.196		Item 22.1 - 40mm Ø PVC tank adaptor	No.	1		
4.197		Item 22.2 - 40mm Ø MS straight pipe length threaded both ends, approx. length = 280mm	No.	1		
4.198		Item 22.3 - 50mm Ø MS blank flange drilled and fitted with 40mm Ø BSP female thread	No.	1		
4.199		Item 22.4 - 50mm Ø Viking Johnson (or similar approved) dismantling joint	No.	2		
4.200		Item 22.5 - 50mm Ø MS 90° flanged elbow	No.	2		
4.201		Item 22.6 - 50mm Ø MS straight pipe length, flanged both ends, length = 1000mm F/F	No.	1		
4.202		Item 22.7 - 50mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 422mm from upstream end, approx. length = 1392mm F/F	No.	1		
4.203	PB	Item 22.8 - 50mm Ø AVK Series 43/60 (or similar approved) Class 16 flanged resilient seal gate valve with handwheel and non-rising spindle	No.	1		
4.204		Item 22.9 - 50mm Ø MS straight pipe flanged both ends with puddle flange welded approx. 636mm from upstream end, approx. length = 1058mm F/F	No.	1		
4.205		Item 22.10 - 63 x 50mm Ø Viking Johnson (or similar approved) flange adaptor	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>DOMESTIC WATER SUPPLY PIPEWORK</b>				
	<b>8.2.5</b>	<b>Supply and install domestic water supply pipework, fittings and valves as per Drawing No. 316WS-C.08</b>				
4.206		Item 23.2 - 63 x 40mm Ø Plasson (or similar approved) PN10 reducing tee with threaded male offtake	No.	1		
4.207		Item 23.3 - 40mm Ø Cobra (or similar approved) brass gate valve	No.	3		
4.208		Item 23.4 - 40mm Ø Plasson (or similar approved) PN10 male adaptor	No.	4		
4.209		Item 23.6 - 40 x 32mm Ø Plasson (or similar approved) PN10 90° bend with threaded male offtake	No.	1		
4.210		Item 23.7 - 32mm Ø Cobra (or similar approved) brass gate valve	No.	6		
4.211		Item 23.8 - 32mm Ø Plasson (or similar approved) PN10 male adaptor	No.	6		
4.212		Item 23.10 - 63 x 32mm Ø Plasson (or similar approved) PN10 reducing tee with threaded male offtake	No.	1		
4.213		Item 23.11 - 63 x 50mm Ø Plasson (or similar approved) PN10 reducing tee	No.	1		
4.214		Item 23.13 - 63 x 50mm Ø Plasson (or similar approved) PN10 reducing coupling	No.	1		
4.215		Item 23.14 - 50 x 40mm Ø Plasson (or similar approved) PN10 reducing tee with threaded male offtake	No.	1		
4.216		Item 23.15 - 50 x 32mm Ø Plasson (or similar approved) PN10 male adaptor	No.	1		
4.217		Item 23.16 - 50mm Ø Plasson (or similar approved) PN10 equal tee	No.	1		
	<b>8.2.5, PC</b>	<b>Supply and install standpipe pipework, fittings and valves as per Drawing No. 316WS-C.09</b>				
4.218		Item 24.2 - 32 x 20mm Ø Plasson (or similar approved) PN10 female adaptor	No.	5		
4.219		Item 24.3 - 20mm Ø MS straight pipe length, threaded, length = 500mm	No.	5		
4.220		Item 24.4 - 20mm Ø MS 90° bend, threaded	No.	10		
4.221		Item 24.5 - 20mm Ø MS straight pipe length, threaded, length = 1250mm	No.	5		
4.222		Item 24.6 - 20mm Ø MS straight pipe length, threaded, length = 120mm	No.	5		
4.223		Item 24.7 - 20mm Ø MS socket, threaded	No.	5		
4.224		Item 24.8 - 20mm Ø Cobra (or similar approved) heavy duty brass bib hose tap	No.	5		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	8.2.13	<b>CHAMBERS</b>				
4.225	LI	Supply and install isolating valve chamber complete as per Drawing No. 316WS-C.09	No.	12		
<b>ANCILLARY CONCRETE WORKS</b>						
4.226	8.2.11, LI	Concrete grade 15/19 thrust blocks and anchors to tees and bends complete, including all labour work, formwork etc.	m <sup>3</sup>	5		
4.227	8.2.12, LI	Concrete encasement (15MPa) of HDPE pipelines (where instructed by the Engineer) complete including all labour work, formwork etc. as per Drawing No. 316WS-C.15	m <sup>3</sup>	50		
4.228	LI	Construct concrete plinths for above ground steel pipeline sections complete including all labour work, formwork and reinforcing etc. as per Drawing No. 316WS-C.15. Assume 150kg of reinforcing per m <sup>3</sup> of concrete for pricing	m <sup>3</sup>	24		
<b>DOMESTIC WATER SUPPLY ANCILLARIES (See Drawing No's. 316WS-C.06 and 316WS-C.07)</b>						
4.229		Supply and install 4750l domestic water supply Jo-Jo tank (or similar approved)	No.	1		
4.230	SANS1200 C, 8.2.1, LI	Clear and grub for tank base	m <sup>2</sup>	16		
4.231	SANS1200 DA, 8.3.1, LI	Excavate, backfill and compact in all materials for tank base	m <sup>3</sup>	2		
4.232	SANS1200 GA, 8.1.4, LI	Construct tank base from grade 25/19 concrete complete including one layer of Ref 395 weld mesh and formwork	m <sup>3</sup>	1		
<b>STANDPIPES (See Drawing No. 316WS-C.09)</b>						
4.233	SANS1200 C, 8.2.1, LI	Clear and grub for standpipe apron slab	m <sup>2</sup>	8		
4.234	SANS1200 DA, 8.3.1, LI	Excavate, backfill and compact in all materials for standpipe apron slab	m <sup>3</sup>	0.8		
4.235	SANS1200 GA, 8.1.4, LI	Construct concrete upstand complete including reinforcing as detailed and use of 160mm Ø uPVC pipe shutter 1400mm long. Shutter to be stripped after casting.	No.	4		
4.236	SANS1200 GA, 8.1.4, LI	Construct standpipe base from grade 20/19 concrete complete including one layer of Ref 193 weld mesh and formwork	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>BRICKWORK MASONRY HEADWALL</b>				
4.237	LI	Construct brickwork masonry headwall for backwash/ waste pipeline outlet to sludge dam complete as per Drawing No. 316WS-C.15	No.	1		
		<b>PIPE SUPPORT BRACKETS</b>				
4.238		Supply and install wall-mounted steel pipe support brackets as detailed on Drawing No. 316WS-C.16. Refer to Drawing No. 316WS-C.03 for proposed positions within the treatment works building.	No.	6		
4.239		Supply and install floor-mounted steel pipe support brackets as detailed on Drawing No. 316WS-C.16. Refer to Drawing No. 316WS-C.03 for proposed positions within the treatment works building.	No.	11		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY****CREIGHTON BULK WATER SUPPLY SCHEME****CONTRACT NUMBER: HGDM 821/HGDM/2022****UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY****SCHEDULE OF QUANTITIES****SECTION 5: BUILDING WORKS**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	PD	<b>SECTION 5: BUILDING WORKS</b>				
		<b>TREATMENT WORKS BUILDING</b>				
	PD 2, LI	<b>BRICKWORK</b>				
5.001	PD 9.1	230 mm thick brick wall in facebrick	m <sup>2</sup>	1800		
5.002	PD 9.1	230 mm thick brick wall with facebrick exterior and non-facing engineering bricks interior	m <sup>2</sup>	80		
5.003	PD 9.1	280 mm thick cavity wall with facebrick exterior and non-facing engineering bricks interior	m <sup>2</sup>	20		
5.004	PD 9.1	115 mm thick half brick interior non-facing engineering brick walls	m <sup>2</sup>	110		
5.005		229 x 152mm clay vermin proof air bricks	No.	20		
	PD 2.3, LI	<b>PLASTERWORK</b>				
		<i>15 mm thick steel-float finish to:</i>				
5.006	PD 9.2	Brick walls	m <sup>2</sup>	310		
		<b>TILES</b>				
		<i>Supply and lay white porcelain tile complete with tile adhesive and grouting to:</i>				
5.007		Walls	m <sup>2</sup>	50		
5.008		Filtered water chamber walls and floor slab using approved grout and tiles suitable for continual immersion	m <sup>2</sup>	60		
5.009		Extra-over items 5.007 & 5.008 for rounded edging for tiling	m	40		
	PD 8, LI	<b>PAINTWORK</b>				
		<i>Apply one coat primer and two coats water based enamel paint (type 4):</i>				
5.010	PD 9.7	Plastered walls	m <sup>2</sup>	260		
5.011	PD 9.7	Wooden doors and frames	No.	8		
		<i>Apply one coat primer and two coats PVA paint (type 3):</i>				
5.012	PD 9.7	Internal smooth concrete ceilings	m <sup>2</sup>	300		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	<b>PD 3, PD 4, PD 5</b>	<b>DOORS AND WINDOWS</b>				
5.013	PD 9.4	Heavy duty galvanised steel transformer double panel door and frame with louvred vent fitted with SABS approved commercial grade 4 lever mortice lockset and padlatch to fit 1810 W x 2110 H mm opening	No.	1		
5.014	PD 9.4	Heavy duty galvanised steel transformer double panel door and frame with louvred vent fitted with SABS approved commercial grade 4 lever mortice lockset and padlatch to fit 2200 W x 3500 H mm opening	No.	1		
5.015	PD 9.4	Heavy duty galvanised steel combination standard size single panel door and frame to fit 910 W x 2110 H mm opening, fitted with SABS approved commercial grade 4 lever mortice lockset and padlatch	No.	6		
5.016	PD 9.4	Heavy duty galvanised steel combination standard size single panel door and frame to fit 1010 W x 2110 H mm opening, fitted with SABS approved commercial grade 4 lever mortice lockset and padlatch	No.	1		
5.017	PD 9.4, PD 9.6	Hardwood (Meranti) door frame 53 x 86 mm complete with Hardwood (Meranti) solid BB door and SABS approved commercial grade 3 lever mortice lockset to fit 910 W x 2110 H mm opening	No.	4		
5.018	PD 9.4, PD 9.6	Hardwood (Meranti) door frame 53 x 86 mm complete with Hardwood (Meranti) solid BB door and SABS approved commercial grade 3 lever mortice lockset to fit 1010 W x 2110 H mm opening	No.	2		
5.019	PD 9.4, PD 9.6	Hardwood (Meranti) door frame 53 x 86 mm complete with Hardwood (Meranti) solid BB door and SABS approved commercial grade 3 lever mortice lockset to fit 810 W x 2110 H mm opening	No.	3		
5.020	PD 9.4	2440Wx2050H Roller Shutter Door	No.	1		
		<i>Rolled mild steel industrial window frames (FX7)</i>				
5.021	PD 9.4	Steel window size 600mm W x 600mm high, with 2no. vert. x 2no. hor. panes. Painted two coats white NS4 paint or similar approved prior to installation	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
5.022	PD 9.4	Steel window size 910 mm x 910 mm high h, with 1no. vert. x 1no. hor. panes. Painted two coats white NS4 paint or similar approved prior to installation	No.	1		
5.023	PD 9.4	Steel window size 1500mm W x 1200mm high, with 3no. vert. x 2no. hor. panes. Painted two coats white NS4 paint or similar approved prior to installation	No.	2		
5.024	PD 9.4	Steel window size 1800mm W x 1200mm high, with 4no. vert. x 2no. hor. panes. Painted two coats white NS4 paint or similar approved prior to installation	No.	2		
5.025	PD 9.4	Steel window size 3160mm W x 2100mm high, with 4no. vert. x 3no. hor. panes. Painted two coats white NS4 paint or similar approved prior to installation	No.	4		
	<b>PD 5</b>	<b>CARPENTRY AND JOINERY</b>				
5.026	PD 5.3.6	19 x 76mm Meranti skirtings including 20mm quadrant bead nailed	m	129		
5.027		Provisional sum for kitchen cupboards and counter tops	Prov Sum	1	R50 000.00	R50 000.00
5.028		Management, Overheads, Charges & Profit on Item 5.027	%	10%	R50 000.00	R5 000.00
	<b>SANS1200 LD</b>	<b>SEWER</b>				
	<b>8.2.1</b>	<b>Supply, handle, lay and bed uPVC Class 34 sewer pipes to SANS 791:2014 of the following diameters:</b>				
5.029		From toilets to conservancy tank located at entrance to premises (160mm dia)	m	150		
5.030		Grey water from kitchens & showers to sludge dam (110mm dia)	m	110		
	<b>8.2.2</b>	<b>Specials and fittings</b> <i>Extra-over uPVC sewer pipes for fittings:</i>				
5.031		110mm uPVC bend 87.5°	No.	2		
5.032		110mm uPVC bend 1/16	No.	2		
5.033		110mm uPVC bend 1/8	No.	2		
5.034		110mm uPVC junction 45°	No.	2		
5.035		100mm Ø uPVC rodding eye complete	No.	4		
	<b>8.2.3, LI</b>	<b>Manholes</b>				
		Construction of manhole complete from precast 1m diameter concrete manhole rings (Rocla or similar approved), step irons at 300cc, including benching, lockable cover and frame, for depths:				
5.036		Up to 3 m	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CONSERVANCY TANK</b>				
5.037		Supply and install to manufacturers specifications 1 x 9500l SABS or Agreement Certified Calcamite or similar approved Rotamoulded Underground modular Conservancy Tank (Including excavation and backfill in soft material)	No.	1		
	<b>PD 7</b>	<b>PLUMBING</b>				
5.038		Franke Quinline QLX622 stainless steel sink or similar approved with Cobra 296/15 star single hole sink mixer or similar approved including angle regulating valves, 2 No. Cobra 316 wastes, plugs & chains, double flexi combination mini P-trap and pipes/braided connectors and 15mm Ballostop valves (incl all 50mm uPVC pipework to external 110mm wastepipe)	No.	1		
5.039		Franke SIRX Stainless Steel wall mounted wash trough or similar approved for laboratory including angle regulating valves, 2 No. Cobra 316 wastes, plugs & chains, double flexi combination mini P-trap and pipes/braided connectors and 15mm Ballostop valves (incl all 50mm uPVC pipework to external 110mm waste pipe)	No.	1		
5.040		Vaal Hibiscus (7050) white vitreous china basin bolted to wall, two Cobra 211/15 star pillar taps with basin waste, plug & chain, 1 Cobra 350 bottle trap, service pipes/braided connectors, 15mm Ballostop valves (incl 50mm uPVC pipework to external 110mm waste pipe)	No.	2		
5.041		Vaal Aquasave (755499) or similar approved white vitreous china low level suite complete with flushing mechanism and fittings, flush pipe connector, 15mm Ballostop valve, service pipe/braided connector and A1 heavy duty seat and lid	No.	3		
5.042		Vaal Flatback vitreous china wall urinal (8127ZO) including 2 hanger brackets, Cobra 8787ZO domical grating, Cobra 360 bottle trap, Cobra 8543 spreader, Flushmaster FJ6 flush valve and FJT5.5 flush pipe (incl all 50mm uPVC pipework to reducing junction)	No.	1		
5.043		Brass Bibtap for outside use, positioned above gully and securely attached to wall	No.	3		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
5.044		Allow for complete hot and cold water installation using 15mm copper pipes (Class 0) with capillary fittings, chased into walls and including isolating stopcock on external wall and connection to 40mm HDPE mains supply pipe measured elsewhere	Sum	1		
5.045		Allow for complete 110 PVC SV discharge pipework to exterior of building including branch connections and vented discharge stacks conforming to SANS 10400 requirements. To be connected into 110 sewer line at base of building	Sum	1		
5.046		Supply and install 150l Class B Geyser (SANS 151) complete with pressure control and safety valves, vacuum breakers and inlet/outlet/discharge pipework. Installation conforming to SANS 10525-1 and SANS 10254	No.	1		
5.047		Fire hose reel (SABS) with 50 m hose	No.	2		
5.048		Fire water pipework reticulation to fire hose reel including all bends, etc (from connection point on outside of external wall up to fire hose reel)	Sum	1		
		<b>DRAINAGE</b>				
		<i>Rainwater drainage:</i>				
5.049		Supply and install complete 150mm industrial aluminium guttering to roof with 5 funnel outlets	No.	5		
5.050		Supply and install 6.6m x 110mm diameter PVC SV rainwater downpipes (SABS) including connection to gutter outlet, bends, heavy duty galvanised holderbat brackets and discharge shoe	No.	5		
		<b>MISCELLANEOUS ITEMS</b>				
5.051		Provisional sum for the equipment of the control room, laboratory, mens and ladies locker rooms and kitchen with furniture, appliances, signage and other accessories	Prov Sum	1	R120 000.00	R120 000.00
5.052		Management, Overheads, Charges & Profit on Item 5.051	%	10%	R120 000.00	R12 000.00
5.053		4,5 kg DCP fire extinguisher	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>GUARD HOUSE</b>				
	<b>PD 2, LI</b>	<b>BRICKWORK</b>				
5.054	PD 9.1	230 mm thick brick wall in facebrick	m <sup>2</sup>	60		
5.055		229 x 152mm clay vermin proof air bricks	No.	2		
	<b>PD 8, LI</b>	<b>PAINTWORK</b>				
		<i>Apply one coat primer and two coats water based enamel paint (type 4):</i>				
5.056	PD 9.7	Wooden doors and frames	No.	1		
		<i>Apply one coat primer and two coats PVA paint (type 3):</i>				
5.057	PD 9.7	Rhinoboard ceilings	m <sup>2</sup>	15		
5.058	PD 9.7	Nutec fascias	m <sup>2</sup>	30		
	<b>PD 3, PD 4, PD 5</b>	<b>DOORS AND WINDOWS</b>				
5.059	PD 9.4, PD 9.6	Hardwood (Meranti) frame 53 x 86 mm complete with 813 x 2032 mm Hardwood (Meranti) solid BB door and SABS approved commercial grade 3 lever mortice lockset	No.	1		
		<i>Rolled mild steel industrial window frames (FX7)</i>				
5.060	PD 9.4	Steel window size 1511 mm x 1245 mm high (Type D4). Painted two coats white NS4 paint or similar approved prior to installation	No.	2		
5.061	PD 9.4	Steel window size 533 mm x 654 mm high (Type E1). Painted two coats white NS4 paint or similar approved prior to installation	No.	2		
	<b>PD 6</b>	<b>ROOF SHEETING</b>				
5.062		Supply and install "Kliplok 700" Zinalume concealed fix roof sheeting 0.53mm minimum thickness on Sisalation FR405 underlay, 38 x 50mm battons, prefabricated structural grade CCA treated timber gangnail trusses complete by specialist. Engineers certificate to be provided for completed roof.	m <sup>2</sup>	30		
5.063		Supply and install 225 x 12mm Nutec fibre cement fascias	m	15		
5.064		Supply and install Zinalume 462 barge flashing to match roof sheeting	m	15		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
	PD 5, LI	<b>CARPENTRY AND JOINERY</b>				
5.065	PD 5.3.8	9.5mm Gypsum Rhinoboard flush plastered ceilings including brandering, approved eco friendly blanket insulation conforming to SANS 1381-1 and 10400, cornices and trap doors	m <sup>2</sup>	30		
5.066	PD 5.3.6	19 x 76mm Meranti skirtings including 20mm quadrant bead nailed	m	30		
		<b>DRAINAGE</b>				
		<i>Rainwater drainage:</i>				
5.067		Supply and install complete 150mm industrial aluminium guttering to roof with 5 funnel outlets	m	11		
5.068		Supply and install 6.6m x 110mm diameter PVC SV rainwater downpipes (SABS) including connection to gutter outlet, bends, heavy duty galvanised holderbat brackets and discharge shoe	No.	1		
		<b>MISCELLANEOUS ITEMS</b>				
5.069		4,5 kg DCP fire extinguisher	No.	4		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>SPLITTER BOX</b>				
	<b>PD 8, LI</b>	<b>PAINTWORK</b>				
		<i>Apply one coat primer and two coats water based enamel paint (type 4):</i>				
5.070	PD 9.7	Wooden doors and frames	No.	1		
		<i>Apply one coat primer and two coats PVA paint (type 3):</i>				
5.071	PD 9.7	Concrete ceilings	m <sup>2</sup>	9		
5.072	PD 9.7	Internal walls	m <sup>2</sup>	4		
	<b>PD 3, PD 4, PD 5</b>	<b>DOORS AND WINDOWS</b>				
5.073	PD 9.4, PD 9.6	Hardwood (Meranti) frame 53 x 86 mm complete with 1810 x 2110 mm Hardwood (Meranti) solid BB double door and SABS approved commercial grade 3 lever mortice lockset	No.	1		
		<i>Rolled mild steel industrial window frames (FX7)</i>				
5.074	PD 9.4	Steel window size 1800 mm x 600 mm high . Painted two coats white NS4 paint or similar approved prior to installation	No.	1		
	<b>PD 5, LI</b>	<b>CARPENTRY AND JOINERY</b>				
5.075	PD 5.3.6	19 x 76mm Meranti skirtings including 20mm quadrant bead nailed	m	30		
		<b>MISCELLANEOUS ITEMS</b>				
5.076		4,5 kg DCP fire extinguisher	No.	1		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**

**CREIGHTON BULK WATER SUPPLY SCHEME**

**CONTRACT NUMBER: HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**

**SECTION 6: ROADS**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 6: ROAD WORKS AND STORMWATER</b>				
	<b>SANS1200 C</b>	<b>SITE CLEARANCE</b>				
6.001	8.2.1	Site clearance to road reserves	m <sup>2</sup>	3261		
6.002	8.2.10	Remove 100 mm topsoil from road reserves to stockpile and maintain	m <sup>3</sup>	326		
	<b>SANS1200 DM</b>	<b>SUBGRADE</b>				
6.003	8.3.3	Rip and recompact in-place material to 90% of MAMDD (100% for sand)	m <sup>3</sup>	315		
6.004	8.3.4	Cut to fill and compact to 90% of MAMDD	m <sup>3</sup>	80		
6.005	8.3.4	Borrow to fill G7 Material from commercial sources (including hauling the material over an unlimited free-haul distance) and compact to 90% of MAMDD	m <sup>3</sup>	1210		
	<b>8.3.7</b>	<b>Cut to spoil from:</b>				
6.006		Soft and intermediate excavation	m <sup>3</sup>	45		
6.007		Hard rock excavation	m <sup>3</sup>	45		
6.008		Boulder excavation, Class A	m <sup>3</sup>	45		
		<b>LAYERWORKS</b>				
	<b>SANS1200 ME</b>	<b>SUBBASE</b>				
6.009	8.3.3	Construct subbase 150 mm thick with G7 material from commercial sources (including hauling the material over an unlimited free-haul distance) compacted to 95% MAMDD	m <sup>3</sup>	365		
	<b>SANS1200 MF</b>	<b>BASE</b>				
6.010	8.3.3	Construct G2 base 200 mm thick with material obtained from commercial sources (including hauling the material over an unlimited free-haul distance) compacted to 98% of MAMDD	m <sup>3</sup>	435		
<b>SUB - TOTAL CARRIED FORWARD</b>						



ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>Stabilization</b>				
6.011	8.3.5 (d)	Process subbase material by stabilization	m <sup>3</sup>	325		
		<b>Stabilizing agent</b>				
6.012	8.3.8	Supply of cement (3% of MDD)	t	18		
	<b>SANS1200 MJ</b>	<b>SEGMENTED PAVING</b>				
	<b>8.2.2</b>	<b>Construction of pavement complete</b>				
6.013		Class 35 (35MPa) 80mm interlocking block pavers on 20mm bedding sand	m <sup>2</sup>	1800		
		<b>Topsoil</b>				
6.014	8.3.10, LI	Placing of topsoil 100 mm thick on verges and banks	m <sup>2</sup>	1680		
		<b>Grassing</b>				
6.015	8.3.11, LI	Grassing of embankments and verges	m <sup>2</sup>	1680		
	<b>SANS1200 MK</b>	<b>KERBING</b>				
6.016	8.2.1	Precast concrete kerbing, semi-mountable Kerb, SANS Figure 7 in Grade 25 MPa/19 mm concrete bedding and backing complete	m	750		
6.017	8.2.6.1	Transition kerbs - cast insitu using 30 MPa/19 mm concrete	m	80		
	<b>SANS1200 MM</b>	<b>PERMANENT ROAD SIGNS</b>				
	<b>8.3.6</b>	<b>Statutory signs, street names and the like supplied and erected complete</b>				
6.018		Regulatory signs (R series)	No.	4		
	<b>SANS1200 A</b>	<b>ANCILLARY ROADWORKS</b>				
6.019	8.5	Tests ordered by the Engineer	Prov Sum	1	R25 000.00	R25 000.00
6.020		Management, Overheads, Charges & Profit on Item 6.019	%	10%	R25 000.00	R2 500.00
	<b>COLTO 2100 : DRAINS</b>	<b>CHUTES</b>				
6.021	21.05	Banks & Dykes - Construct Mitre Drains @ 20m intervals on the LHS & RHS sides of the road (From CH70-END), with material from excavation or excess soil from other excavations on site.	m <sup>3</sup>	115		
	<b>SANS1200 MK</b>	<b>KERBING</b>				
6.022	8.2.6.1	Construct daylighting transitions in kerbing at mitre drains	m	24		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**

**CREIGHTON BULK WATER SUPPLY SCHEME**

**CONTRACT NUMBER: HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**

**SECTION 7: ELECTRICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	PG	<b>SECTION 7: ELECTRICAL WORKS</b>				
	SANS1200 DA	<b>EARTHWORKS (SMALL WORKS)</b>				
	SANS1200 DA	<b>Excavation</b>				
	8.3.1 b), LI	<b>Excavate in all materials and backfill, compact and dispose of surplus / unsuitable material, for electrical cables and poles:</b>				
7.001		Cable trench 500mm deep x 300mm wide	m	250		
7.002		Cable trench 500mm deep x 600mm wide	m	10		
7.003		Street light pole 700mm deep	No.	5		
7.004		Flood lightmast plinth hole 600mm x 600mm	No.	3		
7.005		Supply and install cable danger marker tape per 100m roll in accordance with the specifications	No.	3		
		<b>POWER CABLES AND EARTHING</b>				
		Supply and installation of 4 or 2 core PVC insulated PVC bedded SWA PVC sheathed 600/1000V cable manufactured to SANS1507-3				
7.006		110mm Cable Duct x 6m length	No.	2		
7.007		185mm <sup>2</sup> cu 4-core PVC SWA PVC	m	1		Rate Only
7.008		95mm <sup>2</sup> cu 4-core PVC SWA PVC	m	1		Rate Only
7.009		70mm <sup>2</sup> cu 4-core PVC SWA PVC	m	1		Rate Only
7.010		50mm <sup>2</sup> cu 4-core PVC SWA PVC	m	120		
7.011		10mm <sup>2</sup> cu 4-core PVC SWA PVC + ECC	m	30		
7.012		10mm <sup>2</sup> cu 2-core PVC SWA PVC + ECC	m	65		
7.013		6mm <sup>2</sup> cu 4-core PVC SWA PVC + ECC	m	120		
7.014		2.5mm <sup>2</sup> cu 2-core Cabtyre (Emergency Stops)	m	50		
7.015		4mm <sup>2</sup> cu 2-core PVC SWA PVC + ECC	m	120		
7.016		16mm <sup>2</sup> cu 4-core PVC SWA PVC + ECC	m	30		
7.017		16mm <sup>2</sup> cu 2-core PVC SWA PVC + ECC	m	1		Rate Only
7.018		50mm <sup>2</sup> bare cu ECC	m	1		Rate Only
7.019		35mm <sup>2</sup> bare cu ECC	m	120		
7.020		25mm <sup>2</sup> bare cu ECC	m	1		Rate Only
7.021		16mm <sup>2</sup> bare cu ECC	m	1		Rate Only
7.022		35mm <sup>2</sup> cu 1-core insulated ECC	m	1		Rate Only
7.023		16mm <sup>2</sup> cu 1-core insulated ECC	m	1		Rate Only
7.024		10mm <sup>2</sup> cu 1-core insulated ECC	m	1		Rate Only
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>CABLE TERMINATIONS &amp; SUPPORT</b>				
		Terminations of 4 and 2 core cable including supply of lugs, glands, shrouds and all associated materials not listed				
7.025		185mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	1		
7.026		95mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	1		
7.027		70mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	1		
7.028		50mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	4		
7.029		10mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	10		
7.030		10mm <sup>2</sup> cu 2-core cable termination incl compression gland and lugs	No.	2		
7.031		16mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	2		
7.032		2.5mm <sup>2</sup> cu 4-core cable termination incl compression gland and lugs	No.	32		
7.033		6mm <sup>2</sup> cu lighting cable termination incl 4 x No.2 end connectors and insulating sleeves (st lights)	No.	6		
7.034		4mm <sup>2</sup> cu lighting cable termination incl 2 x No.2 end connectors and insulating sleeves (flood lights)	No.	3		
7.035		Cable racking: Medium duty galvanised 150mm trays or mesh 3m lengths (incl joiner set per length)	Lengths	10		
7.036		Cable racking: Medium duty galvanised 300mm trays or mesh 3m lengths (incl joiner set per length)	Lengths	10		
7.037		Cable racking: Medium duty galvanised 600mm trays or mesh 3m lengths (incl joiner set per length)	Lengths	4		
7.038		Cable racking: Medium duty galvanised 150mm trays or mesh: bends, t-pieces, elbows etc: allow for 10 of each	Sum	1		
7.039		Cable racking: Medium duty galvanised 300mm trays or mesh: bends, t-pieces, elbows etc: allow for 10 of each	Sum	1		
7.040		Cable racking: Medium duty galvanised 600mm trays or mesh: bends, t-pieces, elbows etc: allow for 10 of each	Sum	1		
7.041		Unistrut galvanised for cable racking	Lengths	10		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>MCCs, DBs &amp; KIOSKS</b>				
		The complete design, supply, manufacture, delivery, off-loading, installation and commissioning of switchboards and MCCs (building switchboards (DBs) measured elsewhere)				
7.042		Metering Kiosk 1, outdoor IP65, free standing as per specification	No.	1		
7.043		DB-1: flush wall mount indoor DB as per specification - WTW Building DB	No.	1		
7.044		DB-2: Outdoor Kiosk 1, outdoor IP65, free standing as per specification	No.	1		
7.045		DB-3: flush wall mount indoor DB as per specification - Guard House DB	No.	1		
7.046		MCC-1, indoor, free standing, complete with PLC section as per specification	No.	1		
7.047		FATS: MCC and Kiosks: allow 2 days including travel & accommodation for Engineer	Sum	1		
		<b>INSTRUMENTATION, CONTROL &amp; SCADA/TELEMETRY</b>				
7.048		Level Measurement and Control instrumentation incl cabling, transducers, sensors and associated hardware per Reservoir	No.	2		
7.049		Emergency Stops incl associated supports and installation	No.	12		
7.050		Adroit SCADA system complete with PC, UPS and furniture as specified	Sum	1		
7.051		Telemetry system for SCADA incl communication hardware, cabling and installation	Sum	1		
7.052		System Integrator for PLC engineering and SCADA integration incl travel and accommodation	Sum	1		
		<b>AREA LIGHTING</b>				
7.053		Earth electrode 1.2m with coupling for earthing of masts: 3 per mast	No.	9		
7.054		Reinforced concrete base for 12m steel flood light pole including holddown bolts, nuts, washers and crows foot earthing as per spec	No.	3		
7.055		12m galvanised steel pole with base plate complete with 2 x LED floodlight luminaires incl internal cabling, connectors, switchgear and brackets as per spec	No.	3		
7.056		4.7m galvanised steel street light pole complete with LED luminaire and internal cabling, connectors and switchgear as per spec	No.	5		
7.057		Pole Numbers	No.	8		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
		<b>BUILDINGS: SMALL POWER &amp; LIGHTING</b>				
7.058		WTW Building Lightning Protection by either Messrs SME Earthing & Lightning Protection or Pontins Natal	Sum	1		
7.059		50mm PVC conduit 4m length	No.	4		
7.060		32mm PVC conduit 4m length	No.	4		
7.061		20mm PVC conduit 4m length	No.	160		
7.062		20/32/50mm PVC Conduit accessories (glands/couplings/round boxes with covers etc.)	Sum	1		
7.063		Draw wire 100m roll	No.	10		
7.064		2.5mm2 cu 1-core housewire Red 100m roll	No.	2		
7.065		2.5mm2 cu 1-core housewire White 100m roll	No.	2		
7.066		2.5mm2 cu 1-core housewire Blue 100m roll	No.	2		
7.067		2.5mm2 cu 1-core housewire Black 100m roll	No.	3		
7.068		2.5mm2 cu 1-core housewire Green 100m roll	No.	3		
7.069		1.5mm2 cu 1-core housewire Red 100m roll	No.	2		
7.070		1.5mm2 cu 1-core housewire White 100m roll	No.	2		
7.071		1.5mm2 cu 1-core housewire Blue 100m roll	No.	2		
7.072		1.5mm2 cu 1-core housewire Black 100m roll	No.	3		
7.073		1.5mm2 cu 1-core housewire Green 100m roll	No.	3		
7.074		4mm2 cu 1-core housewire Red 100m roll	No.	1		
7.075		4mm2 cu 1-core housewire Black 100m roll	No.	1		
7.076		Double compartment power skirting	m	40		
7.077		Power skirting ends and bends	Sum	1		
7.078		4x4 galvanised socket outlet box	No.	10		
7.079		Double switched 16A socket outlet with cover: Cbi Electric incl terminations	No.	10		
7.080		32A 2-Pole isolator with cover incl terminations	No.	6		
7.081		IP55 enclosure (aircon isolators)	No.	3		
7.082		2x4 galvanised light switch box	No.	12		
7.083		2x4 single pole single throw switch with cover: CBI Electric incl terminations	No.	12		
7.084		IP65 Outdoor Light Switch	No.	2		
7.085		Power Skirting Socket Outlet 3-Pin & Euro 2 Pin	No.	12		
7.086		4000K 4400Lm LED strip luminaire complete with LED driver, diffuser and mounting bracket (BEKA Vapourline VLN LED Standard version or equivalent to Engineers approval)	No.	45		
7.087		4000K 4400Lm LED strip luminaire complete with LED driver, diffuser and mounting bracket: ATEX Zone 1 classification, vapour proof with stainless steel clips and brackets	No.	5		
7.088		4000K 5800Lm LED outdoor bulkhead luminaire round with LED driver (BEKANOVA LED or equivalent to Engineers approval)	No.	10		
7.089		12W 230VAC LED Downlighter, Spazio Saturn or equivalent, 1400Lm, 4000K	No.	5		
7.090		10A Royce Thompson Photo Electric Cell	No.	2		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.091		IP65 enclosure with clear window for PEC	No.	2		
7.092		230V 2500W Hand dryer wall mount	No.	2		
7.093		18000 BTU split air conditioner - inverter driven with Bluchem coating	No.	3		
		<b>GENERAL</b>				
7.094		New SANS 10142 Electrical Certificate of Compliance for each building	No.	1		
7.095		New SANS 10142 Electrical Certificate of Compliance for common and all other areas incl. exterior area lighting	No.	1		
7.096		Liason and application with Eskom for the upgrade of the Mains Supply to 125A	PC Sum	1	R100 000.00	
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.0: P&G ELECTRICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>FIXED AND VALUE RELATED CHARGES</b>				
7.0-1		Contractual Requirements.	Sum	1		
7.0-2		Provision of facilities on site required by contractor.	Sum	1		
7.0-3		Removal of site establishment on completion.	Sum	1		
7.0-4		Provide name board.	Sum	1		
7.0-5		Plant & Equipment Storage, Insurance and Security				
7.0-6		Provide for storage of plant and equipment on site including protection and security thereof and of stored and installed materials. In addition, for obtaining and providing all sureties and insurances called for in terms of this contract. NB: Materials storage is allowed for elsewhere in the BOQ.	Sum	1		
7.0-7		Notices and Fees				
7.0-8		Allow for co-ordination with other contractors, giving notice to Eskom and the Electrical Contractor and paying all required fees.	Sum	1		
7.0-9		As-Built Information				
7.0-10		Supply five full sets of as-built drawings to show the exact positions of cables, cable joints, road crossings, etc. as well as instruction manuals & spare parts catalogues to spec. These as-built drawings must be handed to the Engineer on completion of the contract.				
7.0-11		Hand sketched drawings	Sum	1		
7.0-12		CAD produced drawings	Sum	1		
7.0-12		OHS Requirements				
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.0: P&G ELECTRICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.0-14		Safety File including approval, PPE, Safety Harnesses, Site Inductions, Medicals etc.	Sum	1		
7.0-15		Training and Handover				
7.0-16		After successful final testing and commissioning of complete installation, allow for training of end-user personnel and handover complete project to client.	Sum	1		
7.0-17		Guarantees				
7.0-18		Allow for a guarantee for a defects liability period of 12 months against defects in components.	Sum	1		
7.0-19		Warranty				
7.0-20		Allow for a warranty for a defects liability period of 36 months against defects in components and installation workmanship.	Sum	1		
7.0-21		Samples				
7.0-22		Allow for selection and presentation of samples to the Engineer. Materials should only be purchased after obtaining approval from the Engineer. Incorrect materials will be replaced with correct materials.	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						



**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
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**SCHEDULE OF QUANTITIES**  
**SECTION 7.0: P&G ELECTRICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.0-23		Testing, Commissioning and Issuing a CoC				
7.0-24		Allow for commissioning and testing of the complete system installation and issuing of a certificate of compliance for the complete PV and related electrical installation at practical completion.	Sum	1		
7.0-25		<b>TIME RELATED CHARGES</b>				
7.0-26		Contractual Requirements.	Month	4		
7.0-27		Operation and maintenance of facilities on site.	Month	4		
7.0-28		Supervision for duration of construction.	Month	4		
7.0-29		Company and office overhead costs.	Month	4		
7.0-30		General responsibilities and other time related obligations.	Month	4		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
7.1-0		<b>BULK METERING</b>				
7.1-1		Supply, delivery to site, storage, erection, Installation, connecting-up, Testing, Commissioning & energising of the items detailed hereafter, handed over in a satisfactory working condition to the Employer, Engineer & Local Authorities, maintained in such condition				
7.1-2		Supply of 11kV Bulk Metering Kiosk (BMK) with 200A circuit breaker as per specification.	No.	1		
7.1-3		Inspection, factory acceptance test (FATs), site acceptance tests and commissioning on site.	No.	1		
7.1-4		Delivery to site, off-loading and installation of BMK.	No.	1		
7.1-5		Supply, delivery and installation of precast plinth for bulk metering kiosk (including required trenching)	No.	1		
7.1-6		Testing to 1 Ohm Earth by Earthing Specialist For Bulk Metering unit.	No.	1		
7.1-7		<b>SUBSTATION</b>				
7.1-8		MINIATURE SUBSTATION 1 (MS1)				
7.1-9		Supply, deliver, and install 315 kVA, 11kV/415V miniature substation with 11kV SF6 ring main unit according to municipality specification.				
7.1-10		Supply minisub with 6% impedance (as per specification).	No.	1		
7.1-11		Delivery to site, off-loading and installation of MS1.	No.	1		
7.1-12		Inspection, factory acceptance tests, site acceptance tests, and commissioning on site of minisub.	No.	1		
7.1-13		Supply and install MV and LV earthing system for the new minisub. Earth impedance test shall conform to technical specification of 1 ohm.	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
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**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-14		<b>SUNDRIES</b>				
7.1-15		Erect danger warning signage made out of barricading tape including supports, etc., as required by law and as described for open trenches and areas where machinery is being used.	m	200		
7.1-16		Labels, Consumables. NB: Labels shall be approved by engineer.	Sum	1		
7.1-17		Danger warning sign for "DANGER HIGH VOLTAGE". NB: Signage shall be approved by engineer.	No.	1		
7.1-18		Danger warning sign for "UNAUTHORISED ENTRANCE PROHIBITED". NB: Signage shall be approved by engineer.	No.	1		
7.1-19		<b>STAND-BY GENERATOR SET</b>				
7.1-20		STANDBY GEN SET 1				
7.1-21		Supply, deliver, install, test and commission 200 kVA, 400V standby generator set according to specification.				
7.1-22		Supply 330kVA, 3 phase, 400V prime rated diesel engine and alternator set with 10% overload available 1 hour in 12 complete with excitation batteries.	No.	1		
7.1-23		Supply and install sound attenuation to 70dBA at 7 meters.				
7.1-24		Supply	No.	1		
7.1-25		Install	No.	1		
7.1-26		Supply and install generator exhaust system.				
7.1-27		Supply	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-28		Install	No.	1		
7.1-29		Supply and install generator container set (entire genset, sound attenuation and control panel to be installed within container).				
7.1-30		Supply	No.	1		
7.1-31		Install	No.	1		
7.1-32		Supply and install generator bulk fuel tank system (including fuel pump, fuel pipes & 100 litre test fuel).				
7.1-33		Supply	No.	1		
7.1-34		Install	No.	1		
7.1-35		Supply and install synchronisation, LV generator protection and control panels.				
7.1-36		Supply	No.	1		
7.1-37		Install	No.	1		
7.1-38		Supply, delivery and installation of precast plinth for standby generator (including required excavation, leveling, trenching and sleeves).				
7.1-39		Supply	No.	1		
7.1-40		Install	No.	1		
7.1-41		12 months maintenance contract.	Sum	1		
7.1-42		Instruction manuals and drawings.	Sum	1		
7.1-43		Inspection, factory acceptance tests, site acceptance tests, and commissioning on site of gen set 1.	No.	1		
7.1-44		Delivery to site, off-loading and installation of gen set 1.	No.	1		
7.1-45		Testing and commissioning of gen set 1 on site.	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
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**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-46		<b>MEDIUM VOLTAGE CABLING</b>				
7.1-47		Note: All material shall be SABS/IEC compliant.				
7.1-48		Terminal Pole to Minisub 1 (MS1)				
7.1-49		Supply, deliver, install and connect 11kV/33kV XLPE distribution cables, bare Aluminium earth conductors installed in trenches, sleeves, cable ladders or cable trays.				
7.1-50		Supply, deliver and install cable terminations including all fastening materials, glands, shrouds, lugs and the connection of the cable lugs to the specified terminal equipment and connectors:				
7.1-51		Cables to have stranded Aluminium conductors. (Installation rate to include for installation of cable within wireways, trays ducts, sleeves, trenches, etc).				
7.1-52		25 mm <sup>2</sup> , 3-core XLPE/SWA Aluminium cable.				
7.1-53		Supply	m	30		
7.1-54		Install	m	30		
7.1-55		25 mm <sup>2</sup> , 3-core XLPE/SWA outdoor terminal pole cable termination kit.				
7.1-56		Supply	No.	1		
7.1-57		Install	No.	1		
7.1-58		25 mm <sup>2</sup> , 3-core XLPE/SWA indoor cable termination kit.				
7.1-59		Supply	No.	1		
7.1-60		Install	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-61		<b>CABLE JOINTING</b>				
7.1-62		Perform a straight through joint to suit 25 sq.mm. 11 kV/33kV XLPE/SWA/PVC cable. The joint to be carried out through circular die sets and compressed through a hexagonal compression crimp. Professional crimping tools to be used and these shall be inspected by the Engineer for approval before use. Provide insulation through heat shrink.	No.	8		
7.1-63		<b>SURGE ARRESTORS</b>				
7.1-64		Supply and install 3 x distribution class 1 gapless Metal Oxide Surge Arresters, for application on non-effectively earthed 11kV systems, non-corrosive environments. Polymer housed. Minimum MCOV : 19.2kV, Maximum residual voltage : 80kV Discharge Current : 10kA, IEC line discharge : Class 1 Creepage : 20mm/kV Complete with disconnecting device, flexible earth lead, insulated mounting bracket, M7 x 50mm mounting bolt, nut, serrated washer and 3 x flat washers.				
7.1-65		Supply	set	1		
7.1-66		Install	set	1		
7.1-67		<b>LOW VOLTAGE CABLING</b>				
7.1-68		Note: All material shall be SABS/IEC compliant.				
7.1-69		Transformer 1 (T1) to Automatic Transfer Switch 1 (ATS1)				
7.1-70		Supply, deliver, install and connect 600V/1000V reticulation cables, bare Copper earth conductors installed in trenches, sleeves, cable ladders or cable trays.				
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-71		Supply, deliver and install cable terminations including all fastening materials, glands, shrouds, lugs and the connection of the cable lugs to the specified terminal equipment and connectors:				
7.1-72		Cables to have stranded Aluminium conductors. (Installation rate to include for installation of cable within wireways, trays ducts, sleeves, trenches, etc).				
7.1-73		150 mm <sup>2</sup> , 4-core PVC/PVC/PVC Aluminium cable.				
7.1-74		Supply	m	60		
7.1-75		Install	m	60		
7.1-76		150 mm <sup>2</sup> , 4-core PVC/PVC/PVC cable terminations (2x				
7.1-77		Supply	No.	4		
7.1-78		Install	No.	4		
7.1-79		120 mm <sup>2</sup> , bare earth Copper wire terminations.				
7.1-80		Supply	No.	60		
7.1-81		Install	No.	60		
7.1-82		120 mm <sup>2</sup> , bare earth Copper wire terminations.	No.	8		
7.1-83		ATS1 to Main Distribution Board (DB-LT)				
7.1-84		Supply, deliver, install and connect 600V/1000V reticulation cables, bare Copper earth conductors installed in trenches, sleeves, cable ladders or cable trays.				
7.1-85		Supply, deliver and install cable terminations including all fastening materials, glands, shrouds, lugs and the connection of the cable lugs to the specified terminal equipment and connectors:				
7.1-86		Cables to have stranded Aluminium conductors. (Installation rate to include for installation of cable within wireways, trays ducts, sleeves, trenches, etc).				
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-87		150 mm <sup>2</sup> , 4-core PVC/PVC/PVC Aluminium cable.				
7.1-88		Supply	m	40		
7.1-89		Install	m	40		
7.1-90		150 mm <sup>2</sup> , 4-core PVC/PVC/PVC cable terminations.				
7.1-91		Supply	No.	2		
7.1-92		Install	No.	2		
7.1-93		120 mm <sup>2</sup> , bare Copper earth wire.				
7.1-94		Supply	m	40		
7.1-95		Install	m	40		
7.1-96		120 mm <sup>2</sup> , bare earth Copper wire terminations.	No.	4		
7.1-97		<b>TRENCHING</b>				
7.1-98		"Rates for trenching shall be inclusive of re-instatement of excavated materials. All sleeves shall be laid on a 150 mm thick bedding of sifted river sand as well as a covering of an equal thickness of the same material where required."				
7.1-99		All trenches for MV cable shall be excavated to a minimum depth of 1100mm below the finished ground level irrespective of the size of sleeve installed.				
7.1-100		All trenches for LV cable shall be excavated to a minimum depth of 700mm below the finished ground level irrespective of the size of sleeve installed.				
7.1-101		MV CABLE TRENCHES				
7.1-102		Trenching and re-instatement for 600mm x 1100mm measured in linear length.				
<b>SUB - TOTAL CARRIED FORWARD</b>						



**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.1: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.1-103		In hand-pickable soil.	m	30		
7.1-104		In soft rock.	m	2		
7.1-105		In hard rock.	m	1		
7.1-106		Supply and installation of sifted sand in trenches.	m <sup>3</sup>	4		
7.1-107		PVC danger warning tape installed at 500 and 300 mm above cable.	m	30		
7.1-108		<b>LV CABLE TRENCHES</b>				
7.1-109		Trenching and re-instatement for 450mm x 700mm measured in linear length.				
7.1-110		In hand-pickable soil.	m	80		
7.1-111		In soft rock.	m	2		
7.1-112		In hard rock.	m	1		
7.1-113		Supply and installation of sifted sand in trenches.	m <sup>3</sup>	8		
7.1-114		PVC danger warning tape installed at 500 and 300 mm above cable.	m	80		
7.1-115		<b>CABLE SLEEVES</b>				
7.1-116		Supply and install 110 mm diameter HDPE sleeves (Code Name Kabelflex - Black) or similar including sealing of sleeve ends excluding excavation.	m	10		
7.1-117		<b>SUNDRIES</b>				
7.1-118		Provide all notices and danger warning signs as required by law and as described.	Sum	1		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
7.2-0		<b>MOTOR CONTROL CENTRE</b>				
7.2-1		MOTOR CONTROL PANEL				
7.2-2		400V Motor control centre (MCC) panel for 4x110kW VSD start control + sump pump, complete with local distribution board, on-board 16A SSO, 32A welding socket, PLC panel and marshalling kiosk (VSD's measured elsewhere).				
7.2-3		Workshop drawing	Sum	1		
7.2-4		Supply of panel manufactured to specification and drawings (incomer panel and MCC panel IP54 RAL 2000).	Sum	1		
7.2-5		Factory acceptance tests (FATs)	Sum	1		
7.2-6		Delivery to site, off-loading and installation of MCC.	Sum	1		
7.2-7		Site acceptance tests.	Sum	1		
7.2-8		Commissioning by panel manufacturer.	Sum	1		
7.2-9		<b>PLC PROGRAMMING</b>				
7.2-10		PLC PROGRAMMING				
7.2-11		1. Time allowance for design and planning of pump station control philosophy, including meetings with client to establish needs and related PLC programming, 2. Time allowance for PLC and HMI programming for pump station control, including offsite test and FAT. 3. Time allowance for PLC and HMI commissioning for pump station control , including SAT.	hours	50		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.2-12		PLC HARDWARE				
7.2-13		1. Supply and installation of PLC, IO Modules and V DC Control Power Supply Equipment. 2. Supply and installation of HMI Screen 3. MCC communication equipment - Supply and installation of Unmanaged Ethernet Switch, Cables, Plugs .	Sum	1		
7.2-14		<b>MOTOR STARTING/STOPPING</b>				
7.2-15		VARIABLE SPEED DRIVE/VARIABLE FREQUENCY DRIVE				
7.2-16		Supply, deliver, install, test and commission free standing 400V Variable frequency drive panel (VFD/VSD) for starting of and electrical supply to 110kW motor/pumps according to specification.				
7.2-17		Workshop drawing	Sum	1		
7.2-18		Supply of panel manufactured to specification and drawings.	No.	1		
7.2-19		Factory acceptance tests (FATs)	Sum	1		
7.2-20		Delivery to site, off-loading and installation of MCC.	No.	1		
7.2-21		Site acceptance tests.	Sum	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.2-21		Commissioning by panel manufacturer.	Sum	1		
7.2-22		STARTER				
7.2-23		DOL Local start & emergency stop buttons mounted on pedestal next to motor, combined with a field isolator for 3x110kW motor				
7.2-24		Supply	No.	4		
7.2-25		Install	No.	4		
7.2-26		HUMAN INTERFACE MODULE (HIM)				
7.2-27		Supply, deliver, install and commission human interface module (HIM) (door mounted), including choke and EtherNet IP module.				
7.2-28		Supply	No.	4		
7.2-29		Install	No.	4		
7.2-30		<b>MOTOR PROTECTION, SWITCHES AND SENSORS</b>				
7.2-31		DRIVE/MOTOR TERMINATOR				
7.2-32		Supply, deliver and install motor terminator for protection				
7.2-33		Supply motor terminator	No.	4		
7.2-34		Install motor terminator within 3 meters of motor terminals, including all cabling, terminations and auxiliary	No.	4		
7.2-35		SENSORS				
7.2-36		Supply, deliver and install sensors and switches for				
7.2-37		Pressure Sensor in Pipes				
7.2-38		Supply	No.	5		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
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**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.2-39		Delivery to site, off-loading and installation	No.	5		
7.2-40		No-flow Sensor in Pipes at Pumps				
7.2-41		Supply	No.	2		
7.2-42		Delivery to site, off-loading and installation	No.	2		
7.2-43		Flow Transmitter in outlet pipe				
7.2-44		Supply	No.	1		
7.2-45		Delivery to site, off-loading and installation	No.	1		
7.2-46		<b>TELEMETERY SYSTEM</b>				
7.2-47		TELEMETERY PANEL				
7.2-48		Supply, deliver and install a telemetry panel complete with RTU, I/O modules, power supply, battery, charger, MDS digital radio, tag reader, double lock enclosure, surge protection and MCC connections.				
7.2-49		Supply telemetry panel	No.	1		
7.2-50		Delivery to site, off-loading and installation.	No.	1		
7.2-51		TELEMETERY PANEL				
7.2-52		Supply, deliver and install Antenna kit, complete with all brackets and cable connections & terminations.				
7.2-53		Supply antenna kit	No.	1		
7.2-54		Delivery to site, off-loading and installation.	No.	1		
7.2-55		SCADA CONFIGURATION				
7.2-56		All labour and commissioning required, including all terminations.	No.	5		
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.2-57		CONTROL CABLING				
7.2-58		New control cable works, supplied, delivered, off-loaded and installed in cable trenches and cable racks, of the following (cable may only be ordered if quantity has been verified with the Engineer):				
7.2-59		1.0 mm <sup>2</sup> , 2-core Cu 600/1000V PVC/PVC/SWA/PVC LV multi-core control cable (overall screened)				
7.2-60		Supply	m	100		
7.2-61		Delivery to site, off-loading and installation.	m	100		
7.2-62		1.5 mm <sup>2</sup> , 4-core Cu 600/1000V PVC/PVC/SWA/PVC LV control cable				
7.2-63		Supply	m	30		
7.2-64		Delivery to site, off-loading and installation.	m	30		
7.2-65		1.0 mm <sup>2</sup> , 4-core Cu 600/1000V PVC/PVC/SWA/PVC LV multi-core control cable (overall screened)				
7.2-66		Supply	m	50		
7.2-67		Delivery to site, off-loading and installation.	m	50		
7.2-68		1.5 mm <sup>2</sup> , 12-core Cu 600/1000V PVC/PVC/SWA/PVC LV multi-core control cable (overall screened)				
7.2-69		Supply	m	50		
7.2-70		Delivery to site, off-loading and installation.	m	50		
7.2-71		1.0 mm <sup>2</sup> , 2-core Dekabon Cable (overall screened)				
7.2-72		Supply	m	50		
7.2-73		Delivery to site, off-loading and installation.	m	50		
7.2-74		2.5 mm <sup>2</sup> , 2-core Cu 600/1000V PVC/PVC/SWA/PVC LV cable.				
<b>SUB - TOTAL CARRIED FORWARD</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**1ML/DAY TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.2: PUMP STATION POWER SUPPLY**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
7.2-75		Supply	m	50		
7.2-76		Delivery to site, off-loading and installation.	m	50		
7.2-77		<b>POWER CABLING</b>				
7.2-78		MCC Panel to Motors				
7.2-79		Supply, deliver, install and connect 600V/1000V reticulation cables, bare Copper earth conductors installed in trenches, sleeves, cable ladders or cable trays.				
7.2-80		Supply, deliver and install cable terminations including all fastening materials, glands, shrouds, lugs and the connection of the cable lugs to the specified terminal equipment and connectors:				
7.2-81		Cables to have stranded Aluminium conductors. (Installation rate to include for installation of cable within wireways, trays ducts, sleeves, trenches, etc).				
7.2-82		120 mm <sup>2</sup> , 4-core PVC/PVC/PVC Aluminium cable.				
7.2-83		Supply	m	100		
7.2-84		Install	m	100		
7.2-85		120 mm <sup>2</sup> , 4-core PVC/PVC/PVC cable terminations.				
7.2-86		Supply	No.	8		
7.2-87		Install	No.	8		
7.2-88		70 mm <sup>2</sup> , bare Copper earth wire.				
7.2-89		Supply	m	100		
7.2-90		Install	m	100		
7.2-91		70 mm <sup>2</sup> , bare earth Copper wire terminations.	No.	8		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**TO 5ML/DAY**

**SCHEDULE OF QUANTITIES**  
**SECTION 7.3: PC & PROVISIONAL SUMS ELECTRICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
7.3-0		<b>PROVISIONAL SUMS</b>				
7.3-1		Provide the following provisional amounts, only to be spent as directed by the engineers;				
7.3-2		<b>CAPITAL CONTRIBUTION AND CONNECTION FEES</b>				
7.3-3		Allow a Provisional Sum for capital contribution towards utility service connection which shall include metering and connection fees to the municipality. Rest of possible costs by the municipality and energy department have been incorporated into the the minisub costs as well as the 11kV cable connection costs.  Safety signage is allowed elsewhere.	Sum	1	R475 000.00	R475 000.00
7.3-4		Allow percentage for profit and attendance on item a above.	%	5	475000	R23 750.00
7.3-5		<b>EARTHING AND LIGHTNING PROTECTION</b>				
7.3-6		Allow a Provisional Sum for Earthmat, earthing and lightning protection structure and building.	Sum	1	R100 000.00	R100 000.00
7.3-7		Allow percentage for profit and attendance on item a above.	%	5	100000	R5 000.00
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						



**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**SCHEDULE OF QUANTITIES**  
**SECTION 8: MECHANICAL**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 8: MECHANICAL WORKS</b>				
		<b>BACKWASH PUMPS</b>				
8.001	PE 4	Supply and installation of backwash pumps and motors complete as per specifications	No.	2		
		<b>DOMESTIC WATER PUMPS</b>				
8.002	PE 5	Supply and installation of domestic water pumps and motors complete as per specifications	Sum	1		
		<b>AIR BLOWERS</b>				
8.003	PE 6	Supply and install rotary twin lobe blowers (including motors) complete as per specifications	No.	2		
		<b>CHLORINE / COAGULANT DOSING</b>				
8.004	PE 2, PE 7.1	Supply and install chlorine dosing system in the chlorine storage and vacuum rooms by specialist supplier, complete as per specifications	Sum	1		
8.005	PE 1, PE 3	Supply, install and commission coagulant dosing system complete by specialist supplier complete as per specifications	Sum	1		
8.006	PE 9	Allowance for temporary relocation of chemical dosing facilities during construction in accordance with the specification	Sum	1		
		<b>CHLORINE SAFETY EQUIPMENT</b>				
	PE 7.2	Supply and install chlorine safety equipment by specialist supplier, complete as per specifications				
8.007		Chlorine detectors with one located in the Chlorine Storage Room and the other located in the Vacuum Room.	No.	2		
8.008		Audible alarm and visual alarm located on the external wall of the chlorine rooms	No.	2		
8.009		Two sets of breathing apparatus for emergency use	No.	2		
8.010		Ammonia torch	No.	1		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
8.011		Extractor fan with elevated (2m above roof) vermin and weather proofed duct	No.	2		
8.012		Foot activated safety shower complete with a water supply from the domestic water supply	No.	1		
8.013		Eye bath complete with a water supply from the domestic water supply	No.	1		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**SCHEDULE OF QUANTITIES**  
**SECTION 9: RETAINER WALLS**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 9: RETAINER WALLS</b>				
		Refer to Drawing No. 316WS-C.14				
	<b>SANS1200 D</b>	<b>EARTHWORKS</b>				
9.001	8.3.2	Excavate and trim to lines and grades for foundations	m <sup>3</sup>	70		
9.002	8.3.4	Backfill behind wall from excavated material stockpile, in layers not exceeding block height, compacted to 90% MAMDD	m <sup>3</sup>	70		
	<b>SANS1200 G</b>	<b>CONCRETE (STRUCTURAL)</b>				
9.003	8.4.3	Supply and place 25MPa concrete in foundations as per detail	m <sup>3</sup>	20		
9.004	8.3.1	Supply and place steel reinforcement in foundations and walls	ton	2		
	<b>COLTO 7400</b>	<b>PATENTED EARTH RETAINING SYSTEMS</b>				
9.005	74 / 58.01	Trimming of batter faces to correct angle and embankment preparation work prior to placement of retaining wall blocks and fill	m <sup>2</sup>	150		
9.006	74.01	Supply and install TERRACE BLOK TYPE TB500 with a minimum constructed mass of 480kg/m <sup>2</sup> including a minimum 300mm wide coarse drainage layer (sand) behind the blocks	m <sup>2</sup>	110		
9.007	74.01	Supply and install TERRACE BLOK TYPE TB300 with a minimum constructed mass of 320kg/m <sup>2</sup> including a minimum 500mm wide coarse drainage layer (sand) behind the blocks. To the top 5 courses of the wall.	m <sup>2</sup>	100		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
9.008	74 / 21.08	Supply, install at NGL elevation behind wall perforated drainage collection pipe (Flo-Pipe by Kaytech) & 19mm stone (0.16m3/m) to maintain gravity flow of water to outside of reinforced soil zone.	m	80		
9.009	74 / 21.10	Wrap drainage collection pipe and 19mm drainage aggregate in Bidim A4 - 1.6m/m	m	80		
9.010	B74.04	Supply and lay Findrain / Wickdrain 200 mm wide at 45° angles along excavated batter at 2m centres, as per manufacturers specifications. Connect to perforated collector pipe. Pipe measured under item 9.008	m <sup>2</sup>	150		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**SCHEDULE OF QUANTITIES**  
**SECTION 10: FENCING**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<b>SECTION 10: FENCING</b>				
		Invisible Wall Fencing Category III type anti-cut and anti-climb security fence with pressed high density mesh panels formed of 4mm diameter high tensile galvanised wires with Marine fusion bonded coating and with 76,2 x 12,7mm apertures reinforced with 40 x 50mm deep "V" formation horizontal recessed bands and 2 x 75mm 70 degree flanges along sides and 2 x 30 degree flanges along top and with 100mm high "shark tooth" type spike rails and 85mm taper locking posts set in and including 400 x 400 x 600mm deep concrete base, fixed in strict accordance to the manufacturer's instructions				
10.001		Security fence 1.8m high	m	450		
10.002		Driveway sliding gate size 5000 x 1800mm high	No.	1		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY****CREIGHTON BULK WATER SUPPLY SCHEME****CONTRACT NUMBER: HGDM 821/HGDM/2022****UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY****MEDIUM-PRESSURE PIPELINES**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
11.0-1	SABS 1200 L	SECTION 11: MEDIUM PRESSURE PIPELINES				
	8.2	SCHEDULED ITEMS				
11.0-2	8.2.1	<u>Supply, lay, bed, joint, test and disinfect the following:</u>				
11.0-3		(a) 200mm NB uPVC Class 16 Rising Main complete with couplings to SANS 966	m	3 000		
11.0-4		(b) 200mm NB Grade A steel, 4,5mm wall thickness, epoxy lined and coated with a polyetherane protective layer PN16 Flanged Suction Line Complete	m	200		
11.0-5	8.2.2	<u>Extra-over for item 8.2.1 for the supplying, laying and bedding of specials complete with couplings</u>				
11.0-6		(i) 11.25° 200mm NB Class 16 bend to SANS 966	No.	12		
11.0-7		(ii) 22.50° 200mm NB Class 16 bend to SANS 966	No.	10		
11.0-8		(iii) 45° 200mm NB Class 16 bend to SANS 966	No.	14		
11.0-9	8.2.5	<u>Supply and Place Pipes, Valves, and Specials for Centocow Clear Water Pump Station</u>				
11.0-10		Unless otherwise stated, steel pipe fittings shall be fabricated from Grade A steel, 4,5mm wall thickness, epoxy lined and coated with a polyetherane protective layer applied on top of the epoxy coating. Flanges to be supplied with all gaskets, bolts, nuts, washers, etc. to suit the stated nominal diameter and pressure rating. Fabrication of fittings and flange drilling shall be in accordance with SANS 719 and SANS 1123 respectively				
11.0-11		200mm ND PN16 flanged 90° Short Radius Bend (Item PT-1)	No.	6		
11.0-12		200mm ND PN16 flanged straight piece, approximately 1200mm long and supplied with puddle flange welded onto piece in accordance with the drawings (Item PT-2)	No.	2		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
11.0-13		200mm ND PN16 flanged dismantling joint (Item PT-3)	No.	4		
11.0-14		200mm x 200mm ND PN16 flanged Equal Tee (Item PT-4)	No.	2		
11.0-15		200mm ND PN16 flanged Ductile Iron Strainer (Item PT-5)	No.	2		
11.0-16		200mmx100mm ND Eccentric Reducer, PN 16 Flanged Both Ends (Item PT-6)	No.	4		
11.0-17		Supply Vertical Multistage Pump, 100mm NB PN16 flanged inlet and outlet, with radial impeller imparting a duty flow of 21l/s at a pumping duty head of 142m complete with a 45kW, 50Hz,380V-415 Motor with 2,955l/min speed (Item PT-7)	No.	2		
11.0-18		200mm ND PN16 flanged both ends straight piece, approximately 500mm long (Item PT-8)	No.	7		
11.0-19		200mm ND PN16 flanged nozzle type non return valve (Item PT-9)	No.	1		
11.0-20		300mm long 200mm ND short piece complete with pressure gauge and transducer, PN16 flanged both ends (Item PT-10)	No.	1		
11.0-21		200mm ND PN16 flanged electromagnetic flow meter, including trunking for cables, cables and water meter reader affixed inside pumphouse walls as directed by the Engineer (Item PT-11)	No.	1		
11.0-22		1,4m long 200mm ND short piece, PN16 flanged both ends (Item PT-12)	No.	2		
11.0-23		200mm ND, PN 16 flanged Resilient Seated Gate Valve to SANS 664, non-rising spindle (Item PT-13)	No.	4		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

HARRY GWALA DISTRICT MUNICIPALITY  
CREIGHTON BULK WATER SUPPLY SCHEME  
CONTRACT NUMBER: HGDM 821/HGDM/2022  
UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM  
1ML/DAY TO 5ML/DAY  
BEDDING PIPES

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
12.0-0	SABS 1200 LB	SECTION 12: BEDDING PIPES				
12.0-1	8.2	SCHEDULED ITEMS				
12.0-2	8.2.2.3	<u>Supply of granular bedding material from commercial sources:</u>				
12.0-3		a) Selected granular material	m <sup>3</sup>	1 586		
TOTAL CARRIED FORWARD TO FINAL SUMMARY						



**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM**  
**1ML/DAY TO 5ML/DAY**  
**MEDIUM-PRESSURE PIPELINES**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
13.0-0	SABS 1200 DB	SECTION 13: EARTHWORKS				
13.0-1	8.3	EARTHWORKS (PIPE TRENCHES)				
13.0-2	8.3.2	Excavation				
13.0-3		a) Excavate in all materials for pipe trenches, stockpile on site, use for backfill and compact to 95% MOD AASHTO dry density, and dispose of surplus and unsuitable material to Contractor's own disposal site, for pipes of nominal diameter of 200mm, for the following depths:				
13.0-4		Up to and including 1.0m	m	1050		
13.0-5		Over 1.0m up to and including 2.0m	m	850		
13.0-6		Over 2.0m up to and including 3.0m	m	600		
13.0-0	b)	Extra-over item a) above for:				
13.0-7	2)	Hard rock excavation	m <sup>3</sup>	950		
13.0-8	8.3.3	Excavation Ancillaries				
13.0-9	8.3.3.1	Make up deficiency in backfill material (provisional)				
13.0-10	c)	by importation from commercial or off-site sources	m <sup>3</sup>	125		
13.0-11	8.3.3.3	Compaction in road reserves to 95% MOD AASHTO	m <sup>3</sup>	50		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY****CREIGHTON BULK WATER SUPPLY SCHEME****CONTRACT NUMBER: HGDM 821/HGDM/2022****UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY****MEDIUM-PRESSURE PIPELINES**

ITEM NO	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
14.0-0	SABS 1200 L	<b>SECTION 14: PIPELINE CHAMBERS - MECHANICAL</b>				
		<b>SCHEDULED ITEMS</b>				
14.0-1		<u>Refer to Airvalve Chamber Piepwork Details</u>				
14.0-2		200mm NB uPVC to Steel, PN16 Flanged Adapter (Item AV-1)	No	10		
14.0-3		200mm ND PN16 flanged straight piece, approximately 800mm long and supplied with puddle flange welded onto piece in accordance with the drawings (Item AV-2)	No	10		
14.0-4		200mm x 200mm ND PN16 flanged Equal Tee (Item PT-4) (Item AV-3)	No.	5		
14.0-5		150mm Long 50mm NB Nipple Threaded Spigot one end, other end welded to 200mm NB PN16 Blank Flange (Item AV-4)	No.	5		
14.0-6		50mm NB female Threaded Ball Valve (Item AV-5)	No.	5		
14.0-7		50mm Double Orifice Air Valve - female threaded (Item AV-6)	No.	5		
14.0-8		200mm ND PN16 flanged dismantling joint (Item AV-7)	No.	5		
14.0-9		<u>Refer t Scourvalve Chamber Piepwork Details</u>				
14.0-10		200mm NB uPVC to Steel, PN16 Flanged Adapter (Item SV-1)	No	6		
14.0-11		200mm ND PN16 flanged straight piece, approximately 750mm long and supplied with puddle flange welded onto piece in accordance with the drawings (Item SV-2)	No	6		
14.0-12		200mm ND PN16 flanged dismantling joint (Item SV-3)	No.	3		
14.0-13		200mm x 80mm ND PN16 flanged Un-Equal Tee (Item SV-4)	No.	3		
14.0-14		80mm ND, PN 16 flanged Resilient Seated Gate Valve to SANS 664, non-rising spindle (Item SV-5)	No.	3		
14.0-15		80mm ND PN16 flanged dismantling joint (Item SV-6)	No.	3		
<b>SUB - TOTAL CARRIED FORWARD</b>						

ITEM NO	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<b>SUB - TOTAL BROUGHT FORWARD</b>						
14.0-16		80mm ND PN16 flanged straight piece, approximately 300mm long and supplied with puddle flange welded onto piece in accordance with the drawings (Item SV-7)	No	3		
14.0-17		200mm ND PN16 flanged straight piece, approximately 325mm long and supplied with puddle flange welded onto piece in accordance with the drawings (Item SV-8)	No	3		
14.0-18		80mm ND PN16 flanged blank flange (Item SV-9)	No	3		
<b>TOTAL CARRIED FORWARD TO FINAL SUMMARY</b>						

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CREIGHTON BULK WATER SUPPLY SCHEME**  
**CONTRACT NUMBER: HGDM 821/HGDM/2022**  
**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**  
**PUMPSTATION CONCRETE (STRUCTURAL)**

ITEM	PAYMENT CLAUSE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
15.0-0	<b>SANS</b> 1200 GA	<b>SECTION 15 - CONCRETE (STRUCTURAL)</b>				
15.0-1		<b>Construction of Pump Station</b>				
15.0-2		<b>SCHEDULED FORMWORK ITEMS</b>				
15.0-3		Smooth				
15.0-4		(a) Horizontal	m <sup>2</sup>	70.00		
15.0-5		(b) Vertical	m <sup>2</sup>	220.00		
15.0-6		(c) Slab Soffit	m <sup>2</sup>	200.00		
15.0-7	8.2.5	Narrow widths (up to 300 mm wide)	m	400.00		
15.0-8	8.2.6	Box out holes/form voids				
15.0-9		(b) Small, other than circular, of area up to and including 0.1 m2				
15.0-10		Over and up to and including				
15.0-11		(i) 0 - 0.5m deep	No	2		
15.0-12		Side of ventilation hole	m <sup>2</sup>	15		
15.0-13	8.3	<b>SCHEDULED REINFORCEMENT ITEM</b>				
15.0-14	8.3.1,	<b>Mild steel bars</b>				
15.0-15		8 mm dia	ton	1		
15.0-16	8.3.1,	<b>High-tensile steel bars</b>				
15.0-17		10 mm dia	ton	2		
15.0-18		12 mm dia	ton	2		
15.0-19		16 mm dia	ton	5		
15.0-20		20 mm dia	ton	5		
15.0-21		25 mm dia	ton	3		
15.0-22		32 mm dia	ton	1		
15.0-23	8.4	<b>SCHEDULED CONCRETE ITEMS</b>				
15.0-24	8.4.2	Blinding layer (15/19) in 50mm concrete (Pumpstation floor)	m <sup>2</sup>	20		
15.0-25	8.4.3	Strength concrete, Grade 25MPa	m <sup>3</sup>	150		
15.0-26		Strength concrete, Grade 30MPa	m <sup>3</sup>	150		
15.0-27	8.4.4	Unformed surface finishes				
15.0-28		(a) Wood-floated finish	m <sup>2</sup>	80		
15.0-29		(b) Steel-floated finish	m <sup>2</sup>	410		
15.0-30	8.5	<b>JOINTS</b>				
15.0-31		Bitumen filler				
15.0-32		(a) Seal around pipe with bituminous roofing felt type 4D and bitumen filler	m	10		
15.0-33		<b>MANSONRY WORK</b>				
15.0-34		Brickwork				
15.0-35		Supply and lay brick masonry above floor slab for superstructure, for walls in true line level to roof soffit to SANS 1200	m <sup>2</sup>	150		
<b>SUB - TOTAL CARRIED FORWARD</b>						

SUB - TOTAL BROUGHT FORWARD						
15.0-36		<b><u>Supply and Install The Pumpstation Miscellaneous Items</u></b>				
15.0-37		<u>Doors</u>				
15.0-38		1800 mm x 2400 mm highsteel door frame with louvers	No.	1		
15.0-39		<u>Windows</u>				
15.0-40		800mm x 600mm steel frame with louvers	No.	3		
15.0-41		<b><u>Plastering</u></b>				
15.0-42		Screed wood floar on brickwork, 25mm Thick on Floors and Landings	m <sup>2</sup>	150		
15.0-43		<b><u>Paintwork</u></b>				
15.0-44		Prepare surfaces and remove all loose material, apply one coat 'Plascon or similar approved Merit Plaster Primer' and two coats 'Plascon or similar approved Double Velvet Pure Acrylic' paint:	m <sup>2</sup>	150		
<b>TOTAL L CARRIED FORWARD TO SUMMARY</b>						

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT No. HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY**

**PART C3: SCOPE OF WORK**

**INDEX**

<b>INDEX</b>	<b>Page SW</b>
<b>PART 1: CIVIL SCOPE OF WORKS</b>	<b>2</b>
C3.1 STANDARDISED SPECIFICATIONS	2
C3.2 PROJECT SPECIFICATIONS	3
<b>PART 1: PROJECT SPECIFICATIONS</b>	<b>5</b>
GENERAL DESCRIPTION	5
CONSTRUCTION AND MANAGEMENT REQUIREMENTS	7
CONSTRUCTION PROGRAMME	8
SITE FACILITIES AVAILABLE	9
OCCUPATIONAL HEALTH AND SAFETY	9
WORKS INSPECTION REQUIREMENTS	11
WATER SUPPLY INTERRUPTIONS	12
<b>PART 2: STANDARDISED SPECIFICATIONS</b>	<b>13</b>
<b>PART 3: VARIATIONS TO STANDARDISED SPECIFICATIONS</b>	<b>14</b>
PSA GENERAL	14
PSD Earthworks	21
PSDB Earthworks (Pipe Trenches)	24
PSG Concrete (Structural)	26
PSL Medium-Pressure Pipelines	38
<b>PART 4: PARTICULAR PROJECT SPECIFICATIONS</b>	<b>45</b>

## PART 1: CIVIL SCOPE OF WORKS

### C3.1 STANDARDISED SPECIFICATIONS

The standard specifications on which this contract is based are Standards South Africa's Standardized Specifications for Civil Engineering Construction SABS 1200.

Although not bound in nor issued with this Document, the following Sections of the Standardized Specifications of SABS 1200 shall form part of this Contract:

AA	1986	:	GENERAL
AB	1986	:	ENGINEER'S OFFICE
C	1980	:	SITE CLEARANCE (As amended 1982)
DA	1988	:	EARTHWORKS (Small Works)
DB	1989	:	EARTHWORKS (Pipe trenches)
DK	1984	:	GABIONS AND PITCHING
DM	1981	:	EARTHWORKS (Roads and Subgrade)
GA	1982	:	CONCRETE (Small Works)
HA	1990	:	STRUCTURAL STEELWORKS
HC	1988	:	CORROSION PROTECTION FOR STRUCTURAL STEELWORKS
LE	1982	:	STORMWATER DRAINAGE
M	1996	:	ROADS (General)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria.

SANS 1921 (2004): Construction and Management Requirements for Works Contracts

- Part 1: General Engineering and Construction Works; and
- Part 2: Accommodation of Traffic on Public Roads Occupied by the Contractor.

**C3.2 PROJECT SPECIFICATIONS**

The project specification is covered in the following sections:

<b>ITEM</b>	<b>DESCRIPTION</b>
	STATUS
	PROJECT SPECIFICATION PORTION 1: GENERAL
PS-1	Project Description
PS-2	Extent of the Works
PS-3	Description of the Site and Access
PS-4	Nature of Ground and Subsoil Conditions
PS-5	Construction and Management Requirements
PS-6	Construction Programme
PS-7	Site Facilities Available
PS-8	Site Facilities Required
PS-9	Existing Services
PS-10	Requirements for Accommodation of Traffic
PS-11	Occupational Health and Safety
PS-12	Adverse Weather Conditions
PS-13	Site Meetings & Reporting
PS-14	Preferential Procurement
	PROJECT SPECIFICATION PORTION 2
PSA	General
PSD	Earthworks
PSDB	Earthworks (Pipe Trenches)
PSG/PSGA	Concrete (Small Works)
PSLB	Bedding (Pipes)
PSLD	Sewers
PSLE	Stormwater Drainage
	PARTICULAR SPECIFICATIONS
PA	Brickwork and Plaster
PB	Carpentry, Joinery and Ironmongery
PC	Painting
PF	Valves
PES	Environmental Specification
PE	Project Specification Occupational Health & Safety Specification



## STATUS

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardized 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 Engineer before the execution of the work under the relevant item.

**PART 1: PROJECT SPECIFICATIONS**

**General Description**

The Creighton Bulk Water Supply Scheme’s Creighton is located on P8-3, Connected to the main road R612 via P122 at Mabelana area. The turn-off at Mabelana is located approximately 45-minutes South-West from Pietermaritzburg or, 15 minutes West of Ixopo.

Co-ordinates: 30°01'53.5" S; 29°48'44.7" E [Creighton Town Reservoir]  
 30° 1'2.96"S; 29°43'22.99"E [Centocow Water Treatment Plant]  
 30°00'41.4" S; 29°43'47.5" E [Abstraction Works]

Creighton is a multi-year bulk water supply project whose main purpose is to supply Creighton Town, a small town with an already on-going recorded agri-industrial growth potential whose water demands have rendered current existing infrastructure insufficient. Project capacity has been augmented to also supply areas near Centocow.

Creighton BWSS has a water requirement of 3Mℓ/d based on 2040 projections, inclusive of proposed developments. Client proposed and re-scoped the project to accommodate additional 2Mℓ/d for Centocow, with the proposed abstraction works relocated from downstream to existing Centocow site that needs to be upgraded. This brings total water requirement to 5Mℓ/d.

Phasing	Contract Name
Phase A	Construction Of Centocow – Umzimkhulu River Abstraction Works: Intake Chamber, Galvanised Steel Tank Sump, High-Lift Pump Station and Installation of Associated Mechanical and Electrical Works
Phase B1	Construction Of 1.4km Long 350mm Diameter Clear Water Pipeline And 300mm Diameter Clear Water Rising Main from Centocow – Umzimkhulu River Abstraction Works to Centocow WTW
Phase B2	Construction Of 10km Long 300mm Diameter Rising Main from WTW To Creighton Town Reservoir
<b>Phase C</b>	<b>Upgrade Of Centocow Water Treatment Works from 1ML/D TO 5ML/D</b>
Phase D	Construction Of 3ML Creighton Town Reservoir
Phase E	Construction Of Creighton Town Reticulation and AC Pipeline Replacement Within Creighton Town Reticulation

Under this Contract, Harry Gwala District Municipality intends to implement the Upgrade of Centocow Water Treatment Works to 5ML/D which includes the following components:

- Construction of a Splitter box
- Construction of Sedimentation tank
- Construction of rapid gravity sand filters and associated ancillary works.
- Construction of 1ML clearwater reservoir
- Construction of a new Centocow and Khukhulela clear water pumpstation
- Construction of a clear water rising main from the treatment works to supply Centocow reservoirs.
- Refurbishment of water distribution network and existing water treatment works

## **DRAWINGS**

### **Drawings Prepared by Engineer**

The drawings issued to tenderers during the tender period must be regarded as provisional and preliminary in order to enable the tenderers to generally assess the scope of work. These drawings are of A2 size and are to be found under **Annexure A** (see separate tender book of drawings).

At the commencement of the contract, the Engineer shall deliver to the Contractor copies of the construction 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. The work shall be carried out in accordance with the latest available revision of the drawings.

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.

## **CONSTRUCTION AND MANAGEMENT REQUIREMENTS**

### **General**

The Contractor is referred to SANS 1200A: General for Construction and Management Requirements for Works Contracts. Certain aspects however require further attention as described hereafter.

### **Management and disposal of water (Read with SANS 1200A sub-clause 5.5)**

The Contractor shall pay special attention to the management and disposal of water and storm water on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

### **Disposal of spoil or surplus material (Read with SANS 1200A sub-clause 5.6)**

The Contractor shall dispose all surplus and unsuitable material in designated spoil areas as directed by the Engineer.

### **Testing (Read with SANS 1200A clause 7)**

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Engineer. The Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Engineer. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

### **Management of the Environment**

An Environmental Management Programme (EMPr) is currently being compiled as part of the process of obtaining environmental authorisation for this project but will be in place before commencement of construction. It is noted that the requirements of the EMPr must therefore be borne in mind when tendering and pricing for this contract. A copy of the EMPr can be made available to the Tenderers should they wish to peruse it during the tender period. The appointed Contractor will be provided with a copy of the environmental authorisation and the EMPr before the commencement of construction.

The Contractor's initial costs for complying with the EMPr as well as all costs to maintain compliance with the EMPr and the environmental authorisation for the duration of the construction period are to be included in the Sums tendered.

### **Security**

The Contractor must ensure that all his/her employees as well as the employees of his/her subcontractors are able to identify themselves as members of the construction team.

## **CONSTRUCTION PROGRAMME**

### **Preliminary programme**

The Tenderer shall include with his tender a preliminary programme to be completed by all Tenderers. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

Tenderers may submit tenders for an alternative Time for Completion in addition to a tender based on the specified Time for Completion. Each such alternative tender shall include a preliminary programme similar to the programme above for the execution of the works, and shall motivate his/her proposal clearly by stating all the financial implications of the alternative completion time.

The Contractor shall be deemed to have allowed fully in his/her tendered rates and prices as well as in his/her programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

### **Programme in terms of Clause 5.6 of General Conditions of Contract (2015)**

It is essential that the construction programme, which shall conform in all respects to Clause 5.6 of the General Conditions of Contract (2015), be furnished within the time stated in the Contract Data. The preliminary programme to be submitted with the tender shall be used as basis for this programme. The Contractor's attention is also drawn to clause 5.7 of the General Conditions of Contract 2015.

The Contractor shall indicate on the programme all critical path activities. In this regard, the Contractor's attention is drawn to Clause 5.12.1 of the General Conditions of Contract (2015), where consideration will only be given to claims for extension of time associated with critical path activities.

Activities must be broken down into sufficient detail so that it is possible to make an accurate

assessment of the actual progress of work in relation to programme at any time.

The Contractor must submit a written progress report together with a copy of the approved construction programme (Gantt Chart) marked up with the current status line for the Engineer's approval at least 48 hours in advance of each formal site meeting. Such meetings will be held at no longer than monthly intervals.

#### **SITE FACILITIES AVAILABLE**

At the commencement of the contract, the Employer shall make a portion of land available to the Contractor for the purposes of setting up his site camp and storage area. The site camp shall be located as close as is practically possible to the Centocow WTW.

Whilst there is drinking water available at the site of the Works, this water is for the use of the staff that currently operate and maintain the Centocow Water Treatment Works. The Contractor shall therefore make his own arrangements for the provision of drinking water for his staff. Any costs associated with this will be deemed to have been allowed for in the Contractor's rates and no additional payment for the provision of drinking water on site will therefore be entertained by the Employer.

Water for construction purposes will be available from the Umzimkhulu River. Any costs associated with the transfer of the water from the Umzimkhulu River to the site of the Works shall be for the Contractor's account. No wastage of water by the Contractor will be tolerated.

There are sanitation facilities present at the site of the Works although these facilities will need to be demolished to make space for the new treatment works building. The Contractor is therefore to provide sufficient on-site ablution facilities for his staff, visitors to the site, as well as for the staff that currently operate and maintain the Centocow Water Treatment Works, in the form of portable chemical latrines. The Contractor will be responsible for the maintenance and servicing of these facilities for the duration of the contract and will ensure that all latrines are maintained in a clean and sanitary working condition. The Contractor shall also be responsible for removing the latrines on completion of the Contract.

Electricity is available on site but is currently being utilised for operating and maintaining the Centocow Water Treatment Works. Use of available electrical connections shall therefore be fully at the discretion of the Harry Gwala District Municipality. The Contractor is therefore advised to make his own arrangements for the provision of electricity for construction purposes. Any costs associated with the provision of power on site for construction purposes as well as for the provision of power to any office buildings on site shall be for the Contractor's account.

#### **OCCUPATIONAL HEALTH AND SAFETY**

##### **General Statement**

It is a requirement of this contract that the Contractor shall provide a safe and healthy working

environment and direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act No. 85 of 1993 (OHS Act) and the Construction Regulations 2014 issued on 17 February 2014 as amended by the Department of Labour.

The Contractor will implement an integrated Safety Health and Environment system (SHE). The environmental management unit and staff will however function separately from the SHE staff and functional area. SHE staff will act as environmental inspectors as part of their health and safety inspections and safety representatives appointed as per the OHS act will also act as environmental representatives.

For the purpose of this contract, the Contractor is referred to **Particular Specification PA – Health and Safety**. The purpose of this Specification is to ensure that Principal Contractors entering into a contract with the Employer maintain a level of performance with regard to health and safety issues during the performance of the contract that is in complete compliance with the relevant Health and Safety Regulations. In this regard the OHS Specifications form an integral part of the Contract and the Principal Contractor shall ensure that their contractors and/or suppliers comply with the requirements of this Specification.

### **Health and Safety Plan**

The Contractor shall, on receipt of notification that he has been awarded the contract, submit his own detailed Health and Safety Plan for the execution of the work under the contract. His Health and Safety Plan must at least cover the following:

- (i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
- (ii) pro-active identification of potential hazards and unsafe working conditions;
- (iii) provision of a safe working environment and equipment;
- (iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (Regulation 5);
- (v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations. During the monitoring, a record of any environmental matters requiring attention will also be recorded.
- (vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
- (vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2014.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs.

### **COVID-19 Requirements and Mitigation**

The Contractor shall be required to fully comply with the Disaster Management Act, Act 57 of 2002 (as amended on the 29<sup>th</sup> April 2020) with regards to the implementation of COVID-19 compliance and mitigation measures on site, or whatever other applicable legislation relating to COVID-19 requirements is in place over the duration of the Contract. It is noted that the Contractor is required as a minimum, to conduct and/or implement the following measures and provide proof thereof:

- Risk assessment and appropriate control measures, which includes the issuing and wearing of personal protective equipment;
- Written appointment of a Compliance officer;
- Compile a workplace plan which will be controlled by the Compliance officer (also refer to Annexure E of the Disaster Management Act);
- Make provision for a rigorous screening programme for COVID-19 infections, as well as the management of positive cases and the reporting to the Employer;
- Provide quarantine and isolation facilities which comply to NICD requirements for employees testing positive for COVID-19 (proof of reservation in an approved facility, where employees' accommodation do not comply to NICD requirements); and
- Arrangements to transport employees from their homes to work and back; and

Further to the above, for the purposes of this Contract, in addition to his own staff, the Contractor shall also be required to make provision for the Engineer's staff in terms of the COVID-19 compliance and mitigation measures. The Engineer's staff is likely to consist of 2 No. staff members based full-time on site as well as day visits from up to 4 additional personnel on a monthly basis.

The relevant rates for H&S compliance in the Bill of Quantities shall include for all COVID-19 compliance and mitigation measures that the Contractor is legally required to implement for the duration of the Contract.

### **Cost of Compliance with the OHS Construction Regulations**

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and any specific Health and Safety requirements of the Employer, as applicable to this contract. Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided for in the Construction Regulations.

### **WORKS INSPECTION REQUIREMENTS**

The works should be inspected on a monthly basis by an environmental specialist to ensure compliance with the Environmental Management Programme. The works should also be inspected on a monthly basis by a Health and Safety specialist to ensure that workers and working conditions comply with the relevant safety requirements.



The works will also be inspected on a regular basis by the Engineer to ensure compliance with the standards, specifications, drawings and details, safety and security etc. all in accordance with the contract.

### **WATER SUPPLY INTERRUPTIONS**

Due to the nature of the Works, water interruptions are possible from time to time, such as when undertaking tie-ins to or during the replacement / upgrading of existing infrastructure. The Contractor shall however be required to execute the Works in such a way as to keep these interruptions to a minimum. This will require the Contractor to implement certain sections of the scope of work alongside the existing infrastructure whilst it is still operational. The Contractor is to account for this within his construction programme (see Project Specification PS3) and no claims for delays resulting from this requirement shall be entertained by the Engineer or the Employer.

Prior to any tie-in or replacement / upgrading of existing infrastructure taking place, the Contractor shall submit a detailed tie-in strategy on how each tie-in will be executed to the Engineer for his approval. The strategy must include a methodology covering: sufficient notice(s) to all affected consumers; a step-by-step tie-in process; plant, labour and materials resources to be used; a timeframe including an estimation of the duration of water supply interruptions; temporary water supply provision, depending on the duration of the anticipated interruption; the filling, pressure testing, flushing; filling, disinfecting, flushing; filling and commissioning of the new infrastructure; isolation of the existing infrastructure etc. Any costs associated with the compilation of these detailed tie-in strategies shall be covered within the Contractor's preliminary and general costs.

## PART 2: STANDARDISED SPECIFICATIONS

The standardised specifications on which this contract is based are **Standards South Africa's Standardised Specifications for Civil Engineering Construction SANS 1200**.

*(Note: "SABS" has been changed to "SANS", without change to the contents of the specifications).*

Although not bound in nor issued with this Document, the following Sections of the Standardised Specifications of SANS 1200 shall form part of this Contract:

SANS 1200 A	:	General
SANS 1200 AA	:	General (small works)
SANS 1200 AB	:	Engineer's office
SANS 1200 C	:	Site clearance
SANS 1200 D	:	Earthworks
SANS 1200 DA	:	Earthworks (small works)
SANS 1200 DB	:	Earthworks (pipe trenches)
SANS 1200 DK	:	Gabions and pitching
SANS 1200 G	:	Concrete (structural)
SANS 1200 GA	:	Concrete (small works)
SABS 1200 HA	:	Structural steelwork (small works)
SANS 1200 L	:	Medium-pressure pipelines
SANS 1200 LB	:	Bedding (pipes)
SANS 1200 LC	:	Cable ducts
SANS 1200 LD	:	Sewers
SANS 1200 LE	:	Stormwater drainage

## **PART 3: VARIATIONS TO STANDARDISED SPECIFICATIONS**

### **PSA    GENERAL**

#### **SCOPE (1)**

*Replace sub-clause 1.1, including the notes, with the following:*

"This specification covers requirements, principles and responsibilities of a general nature which are normally applicable to all civil engineering contracts as well as the requirements for the Contractor's establishment on Site."

#### **INTERPRETATIONS (2)**

##### **Definitions (2.3)**

###### **(a)    *Measurement and payment (c)***

*Replace the definitions for fixed charge and time-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."

#### **MATERIALS (3)**

##### **Quality (3.1)**

*Add the following:*

"No used or recycled material may be used in the Works unless expressly authorized by the Engineer.

Where applicable, materials are to bear the official standardisation mark.

Samples of concrete aggregates and pipe bedding material are to be delivered to an approved laboratory.

Where proprietary materials are specified it is to indicate the quality or type of materials or articles required and where the terms "or other approved" or "or similar approved" are used in connection with proprietary materials or articles, it is to be understood that the approval shall be at the sole discretion of the Engineer."

##### **Ordering of materials (New sub-clause 3.3)**

*Add new sub-clause 3.3 to clause 3:*

"The quantities set out in the Bill of Quantities have been determined from calculations based on data available at the time and should therefore be considered as approximate quantities only. 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 Project Specifications and the Drawings issued to the Contractor for construction purposes.

Any reliance placed by the Contractor on the estimated quantities stated in the Bill of Quantities issued for tendering purposes, or measurements made by the Contractor from the drawings issued for tendering purposes, shall be entirely at the Contractor's risk, and the Employer accepts no liability whatever in respect of materials ordered by the Contractor on the basis of Tender Documents."

## **PLANT (4)**

### **Silencing of Plant (4.1)**

Alter the reference to the "Machinery and Occupational Safety Act, 1983 (Act 6 of 1983)" to "Occupational Health and Safety Act, 1993 (Act 85 of 1993)".

### **Contractor's Office, Stores and Services (4.2)**

*Add the following paragraph before the existing first paragraph in sub-clause 4.2:*

"The Contractor's buildings, sheds and other facilities erected or utilised on the Site for the purposes of the Contract shall be fenced off and shall contain all offices, stores, workshops, testing laboratories, toilet facilities, etc. as may be required by the Contractor. The facilities shall always be kept in a neat and orderly condition. All roadways and pathways inside the enclosed area shall be treated to make them dust free and negotiable under all weather conditions, either with crushed stone, gravel or other approved means.

No personnel may reside on the Site. Only night-watchmen may be on the Site after hours."

*Add the following to the first paragraph of sub-clause 4.2:*

"Stores erected by the Contractor shall be suitable for storing materials for the various sub-contractors engaged on this Contract. Such stores may be combined as one store or separate as the Contractor deems necessary."

### **Completion of Works (New sub-clause 4.3)**

*Add new sub-clause 4.3 to clause 4:*

"On completion of the Works, or as soon as facilities provided by the Contractor under sub-clause 4.2 are no longer required, the Contractor shall remove those facilities and clear surface indications of their presence, such that these areas are reinstated to their original condition. The Contractor is to allow for any costs associated with returning these areas to their original state within his tendered rates."

## **CONSTRUCTION (5)**

### **Protection of Structures (5.3)**

Alter the reference to the "Machinery and Occupational Safety Act, 1983 (Act 6 of 1983)" to "Occupational Health and Safety Act, 1993 (Act 85 of 1993)".

### **Safety (5.7)**

*Re-title this sub-clause "HEALTH AND SAFETY" and replace the contents of this sub-clause with:*

"All work under this Contract shall be carried out in terms of the Occupational, Health and Safety Act, 1993 (Act No. 85 of 1993) and shall be subject to its Construction Regulations, 2014 as well as any Health and Safety Specifications contained within the Project Specifications for this contract."

### **Ground and Access to Works (5.8)**

*Add to the sub-clause:*

"On completion of operations the Contractor shall restore the ground surface, wherever it may have been disturbed, to its original condition by filling in all ruts with material similar to the material within the rut and levelling the ground and, where necessary, planting grass and shrubs as may be required. The Contractor is to allow for any costs associated with returning these areas to their original state within his tendered rates."

## **MEASUREMENT AND PAYMENT (8)**

### **Scheduled Fixed Charge and Value Related Items (8.3)**

#### ***Contractual Requirements (8.3.1)***

*Add to the description:*

"The Contractor's initial costs for complying with the Construction Regulations, 2014 of the Occupational, Health and Safety Act (Act 85 of 1993) shall be included in the Sum tendered."

#### ***Establishment of Facilities on Site (8.3.2)***

##### ***Facilities for the Engineer (8.3.2.1)***

*Re-title the sub-clause "Office Facilities for the Engineer" and add the following:*

"Office facilities to be provided for the Engineer and his assistant shall include two desks with draws, two chairs of adjustable height, two steel stationery cupboards, an A0 size plan table, two drawing racks with hangers, a photocopier/printer-scanner, internet access facilities, an air conditioning unit, a refrigerator, an electric kettle, a tea set and window blinds."

##### ***Dealing with Water (New sub-clause 8.3.5)***

*New sub-clause 8.3.5:*

"The Contractor shall allow for all fixed costs associated with dealing with water and for complying with Clause 5.5 for the duration of the construction period under this item."

##### ***Compliance with OHS Act, Construction Regulations 2014 and OHS specification (New sub-clause 8.3.6)***

*New sub-clause 8.3.6:*

"The tendered sum in the Bill of Quantities shall include full compensation for all fixed-costs associated with maintaining compliance with the requirements of the OHS Act and Regulations (including the Construction Regulations 2014 and OHS Specification) at all times for the full duration

of the Contract. Furthermore, the tendered sums shall also include for all fixed costs associated with the implementation of the required COVID-19 compliance and mitigation measures, as outlined in Project Specification PS 5.3.”

***Environmental Management (New sub-clause 8.3.7)***

*New sub-clause 8.3.7:*

“The costs of whatever nature for complying with all fixed-cost obligations of the Environmental Management Plan and the WUL conditions will be deemed to be covered by the tendered sum in the Bill of Quantities.”

**Scheduled Time Related Items (8.4)**

***Accredited Training (New sub-clause 8.4.6)***

*New sub-clause 8.4.6:*

“The sum tendered under this item shall allow for the Contractor’s cost involved in paying for accredited off site training of local employees including transport to the training venue and accommodation of trainees and shall be paid in monthly instalments.”

***Dealing with Water (New sub-clause 8.4.7)***

*New sub-clause 8.4.7:*

“The Contractor shall allow for all time-based costs associated with dealing with water and for complying with Clause 5.5 for the duration of the construction period under this item.”

***Compliance with OHS Act, Construction Regulations 2014 and OHS specification (New sub-clause 8.4.8)***

*New sub-clause 8.4.8:*

“The tendered sum in the Bill of Quantities shall include full compensation for all time-based costs associated with maintaining compliance with the requirements of the OHS Act and Regulations (including the Construction Regulations 2014 and OHS Specification) at all times for the full duration of the Contract. Furthermore, the tendered sums shall also include for all time-based costs associated with the implementation of the required COVID-19 compliance and mitigation measures, as outlined in Project Specification PS 5.3.”

***Environmental Management (New sub-clause 8.4.9)***

*New sub-clause 8.4.9:*

“The costs of whatever nature for complying with all time-based cost obligations of the Environmental Management Plan and the WUL conditions will be deemed to be covered by the tendered sum in the Bill of Quantities.”

## **PSAB      Engineer's Office**

### **SCOPE (1)**

#### **Sub-clause 1.1**

*Replace the clause with:*

“This specification covers the requirements for offices, be it prefabricated, semi prefabricated, mobile or semi-mobile and associated facilities for the Engineer’s supervisory staff on Site, including the provision of the necessary structures, services and all arrangements in connection with the land on which the facilities are to be provided.

### **MATERIALS (3)**

#### **Name boards (3.1)**

*Add the following to this clause:*

“The Contractor will be required to supply 2 name boards for construction purposes under this contract. The name boards shall be erected at the commencement of construction at locations indicated by the Employer. The tendered rate shall include for the supply and erection of the nameboards at the positions indicated by the Employer, maintenance of the name boards for the duration of the construction period as well as for the removal of the name boards from site upon completion.

In addition, the Contractor is to also supply a permanent signboard for the Creighton WTW as well as permanent signage around the Creighton Water Treatment Works to ensure compliance with the OHS Act, for erection upon completion of construction. Separate provisional sums have been included within the BOQ for these items.”

#### **Office Buildings (3.2)**

*Replace the contents of sub-clause 3.2 with:*

“All buildings provided by the Contractor shall be considered as temporary by nature and may be of fully or partially prefabricated construction. The Contractor shall supply and furnish one air-conditioned “Kwikjack” or similar approved (6m x 3m) office for the use of the Engineer and his/her staff, and one air-conditioned “Kwikjack” or similar approved (9m x 3.4m) conference facility for conducting meetings with kitchen space provided.

The Contractor shall also supply and furnish one air-conditioned “Kwikjack” or similar approved (9m x 3.4m) office with kitchen space provided for the use of the Centocow WTW operators over the Contract period, since the existing office at the works will need to be demolished in order to construct the new treatment works building. Office facilities for the operators shall include two desks with draws, two chairs of adjustable height, two steel stationery cupboards, a photocopier/printer-scanner, internet access facilities, an air conditioning unit, a refrigerator, an electric kettle, a tea set and window blinds

In addition, a shelter, at least 12 m long x 5 m deep and 2.1 m high, constructed of timber frame with 80% shade cloth fixed to the top and to 3 sides, adequately sized to house four motor vehicles, shall be provided. The shade cloth at the sides shall extend to no more than 1.5 m above the finished ground level. The floor of the shelter shall be finished with a gravel layer or crushed stone."

### **Engineer's Accommodation (New clause 3.3)**

"Accommodation for the Engineer and his assistant shall be required under this Contract.

Accommodation for the Engineer and his assistant shall consist of the following: An accommodation unit of two separate single bedrooms, a toilet, a shower and an open plan lounge/dining room/kitchen area. All windows to have curtaining and mosquito netting. Each bedroom shall be furnished with a single bed, a bedside cabinet with lamp, a cupboard with hanging space and shelves, a small table, an air conditioning unit and a refuse bin. The lounge/dining room area shall be furnished with at least four lounge chairs, a coffee table, two side tables, a dining room table with six chairs, a bookcase, a rubbish bin, an air conditioning unit, a colour television set and DSTV system.

The kitchen area shall be furnished with at least two square metres of counter top with cupboards under, at least two wall mounted cupboards, a cooker, a microwave, a refrigerator, an electric kettle, a toaster, a vacuum cleaner, a broom, a dustpan & brush, all necessary crockery, cutlery, pots and pans for at least two people, a washing machine, an outside clothes line and a refuse bin. The unit shall also have a double car port covered with 80% shade cloth."

## **PLANT (4)**

### **Telephone (4.1)**

*Replace the contents of the sub-clause with:*

"The Contractor shall be required to provide internet access at the Engineer's office. In addition, the Contractor shall provide a cellphone for sole use by the Engineer for the duration of the construction period with a minimum monthly allowance of R1000 per month."

## **CONSTRUCTION (5)**

### **Survey Assistants (5.5)**

*Delete the first sentence and substitute the following:*

"The Contractor shall make available to the Engineer two suitably trained and educated labourers for use on and about the site on survey and other work directed by the Engineer at all reasonable times."

### **Survey Equipment (New sub-clause 5.6)**

*Add new sub-clause:*

"The Contractor shall at least provide the following survey equipment on the Site from the commencement to the completion of the Works:

One automatic levelling Engineer's level plus tripod;



One levelling staff (4m long, 1cm gradations);  
Two tachometric staffs (5 m long, 1cm chess-board pattern);  
One spirit level (one metre long);  
One hammer (2kg);  
Two canvas carry-bags;  
One 100 m steel tape;  
One 30 m steel tape;  
One 5 m steel tape;

The survey equipment may be shared by arrangement between the Contractor and the Engineer or his representative on Site. The Contractor shall keep the equipment continuously insured against any loss, damage, or breakage and he shall indemnify the Engineer and the Employer against any claims in this regard. Upon completion of the Works, the survey equipment as listed above shall revert to the Contractor.”

## PSD Earthworks

### • INTERPRETATIONS (2)

#### Definitions (2.3)

*Replace the definition "Borrow" with the following:*

"Borrow material: Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorized widening of excavations. 'Borrow' shall have a corresponding meaning."

*Replace the definition "Specified density" with the following:*

"Specified density: The specified dry density expressed as a percentage of modified AASHTO dry density."

*Replace the definition "Stockpile" with the following:*

"Stockpile (Verb): The process of selecting and, as may be necessary, loading, transporting and off-loading material in a designated area for later use and specific purpose."

*Add the following definitions:*

"Fill: An embankment or terrace constructed from material obtained from excavations or borrow."

Fill (material): Material used for the construction of an embankment or terrace."

### • MATERIALS (3)

#### Classification for Excavation Purposes (3.1)

##### *i. Method of classifying (3.1.1)*

*Add the following:*

"Classification of material other than 'soft excavation' shall be agreed upon before excavation may be commenced.

The Contractor shall immediately inform the Engineer when the nature of the material being excavated changes to such an extent that a new classification is warranted for further excavation. Failure on the part of the Contractor to advise the Engineer in good time shall entitle the Engineer to reclassify, at his discretion, such excavated material."

##### *ii. Classes of Excavation (3.1.2)*

*Delete sub-clause 3.1.2 b) as no separate classification for intermediate materials will be permitted.*

### • CONSTRUCTION (5)

#### Safeguarding of Excavations (5.1.1.2)

*Delete the first paragraph of this and replace with the following:*

"a) The Contractor or his agent or representative appointed in writing by the Contractor shall be deemed to be the 'competent person' as defined in Clause 13(1) of the Construction Regulations, 2014.

**Soil Erosion Measures (New sub-clause 5.1.1.4)**

"Care shall be taken during construction to ensure that free flow paths are maintained in all drains, gutters and waterways. Special precautions shall be taken by the Contractor not to change existing conditions by leaving spoil in waterways. The Contractor shall be responsible throughout the duration of the Contract for the construction and maintenance of all soil erosion preventative measures necessary to protect the land utilised by the Contractor during the Contract from any adverse effects of soil erosion, settlement, scour etc., resulting from the construction activities."

**Methods and Procedures (5.2)**

*iii. Excavation (5.2.2)*

*Add to b):*

"Where outside shuttering is ordered by the Engineer, excavation of not more than 600 mm over the outside dimensions of the structure shall be deemed necessary for the fixing of outside formwork. This extra excavation and refilling, up to 600 mm wide, where necessary is to be measured and paid for under quantities allowed for this purpose in the Bill of Quantities. Outside shuttering shall be used for the construction of all major structures unless ordered otherwise by the Engineer."

*Delete the first sentence of c) and replace with:*

"Each excavated surface on which or against which a permanent concrete structure will be placed shall be trimmed to ensure that there is no projection greater than 20 mm into the excavated profile."

• **MEASUREMENT AND PAYMENT (8)**

**Scheduled Items (8.3)**

*iv. Bulk Excavation (8.3.2)*

*Remove all references to "intermediate excavation" or "intermediate material" from sub-clause b).*

*v. Restricted Excavation (8.3.3)*

*Remove all references to "intermediate excavation" or "intermediate material" from sub-clause b).*

*vi. Grassing (8.3.11)*

*Delete sub-clause 8.3.11 and replace with:*

"Approved grass shall be planted after topsoiling has been completed, with the tufts being spread at not more than 150 mm centres. The planted areas shall be kept neatly trimmed, fertilised and watered. The Contractor shall ensure that the planted areas are kept moist and do not dry out. Any grass that fails to grow shall be replaced by the Contractor, at his expense, with fresh grass until such

time as the Engineer is satisfied that sufficient coverage of the area has been achieved or the Completion Certificate for the Contract has been issued, whichever is achieved first. The rate shall cover the cost of supplying and watering the grass and the labour for planting, watering and maintaining the grass in accordance with this Specification.”

### **PSDB Earthworks (Pipe Trenches)**

## **MATERIALS (3)**

### **Backfill Material (3.5)**

*In the third line of a) substitute "100 mm" for "150 mm".*

### **Selection (3.7)**

*Delete the second sentence and substitute the following:*

"The Contractor is not required to use selective methods of excavating but may do so at his own cost. The Contractor shall however, if so instructed by the Engineer, screen or otherwise treat excavated material in order to produce material suitable for bedding or covering or both bedding and covering for the pipeline."

## **CONSTRUCTION (5)**

### **Soil Erosion Measures (New sub-clause 5.1.2.4)**

"Care shall be taken during construction to ensure that free flow paths are maintained in all drains, gutters and waterways. Special precautions shall be taken by the Contractor not to change existing conditions by leaving spoil in waterways. The Contractor shall be responsible throughout the duration of the Contract for the construction and maintenance of all soil erosion preventative measures necessary to protect the pipelines 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 pipelines."

### **Barricading, Signage, Watching and Lighting (New sub-clause 5.1.5)**

"While the responsibility for the efficient barricading, signage, lighting and watching of all trenches and stacks of materials shall rest upon the Contractor, he shall be required to make the following minimum provisions.

Barricading shall be done by means of at least two pieces of horizontal double sided 'red/white' chevron tape, or equivalent as approved by the Engineer. The tape shall be stretched tightly between suitable supports along both sides and ends of the excavation at approximately 0,45 m and 1,25 m above the ground. The supports shall consist of poles or steel fencing standards securely planted in solid ground so as to enclose the spoil material and the excavations and shall be at not more than 10 m centres, unless directed otherwise by the Engineer.

The Contractor shall make available on Site at all times a sufficient number of steel plates at least 2 m x 1,2 m x 8 mm thick which may be laid across open excavated trenches to provide bridges for vehicles along the route of the work as and where considered necessary by the Engineer."

## **Backfilling (5.6)**

### ▪ ***General (5.6.1)***

*Add to this sub-clause:*

"Notwithstanding the requirements of sub-clauses 5.6.1 and 5.6.6 of SANS (SABS) 1200 DB, no pipe joint or pipe fitting shall be covered by either the blanket fill or the main fill prior to the successful completion of the visual inspection and the pressure testing of the relevant section of the pipeline."

### ▪ ***Disposal of Soft Excavation Material (5.6.3)***

*Replace the sub-clause with:*

"Soft excavation material from the trench, which is unsuitable or has become surplus because of bulking, displacement by the pipe and importation, shall be disposed of along the trench servitude, at designated spoil areas or approved spoil areas furnished by the Contractor, as applicable. The requirements of SANS 1200D shall apply to overhaul and to free haul for the disposal of surplus excavated material."

## **PSG Concrete (Structural)**

### **MATERIALS (3)**

#### **Cement (3.2)**

##### ***Applicable Specifications (3.2.1)***

Unless agreed to otherwise by the Engineer, the cement used on the Works shall be CEM 1, grade 42.5 complying with the requirements of SANS (SABS EN 197-1) 50197-1:2000/EN 197-1:2000.

##### ***Storage of Cement (3.2.3)***

*Add to the sub-clause:*

“Cement shall not be kept in storage for longer than three weeks without the Engineer's permission. The cement store shall be run on a first in, first out basis.”

#### **Aggregates**

##### ***Use of Plums (3.4.2)***

The use of plums will not be permitted, unless agreed to by the Engineer.

#### **Admixtures (3.5)**

Unless approved by the Engineer, neither admixtures nor air-entraining agents shall be used in any concrete.

### **PLANT (4)**

#### **Formwork (4.5)**

##### ***Ties (4.5.3)***

*Add to the sub-clause:*

“The water tightness requirement of the structure shall be taken into account when deciding upon the type of tie to be used. The cover requirement will apply to ties left permanently in place.

No plugs, bolts, ties or clamps of any description used to hold the formwork will be allowed to project into or through the concrete unless expressly approved by the Engineer.

Only approved ferrules consisting of solid rods (that remain embedded in the concrete) and with removable ends shall be used to hold the formwork of the walls. The removable tie-rod ends shall facilitate removal without damage to the concrete, and no permanently embedded parts of such tie-rods shall have less than 50 mm of cover to the finished concrete surface.

The cavities left in the concrete when the tie-rod end cones are removed shall be soundly caulked with a cement mortar to which an approved non-shrink grout has been added strictly in accordance with the

manufacturer's specifications, and shall be neatly finished to a smooth surface uniform with that of the surrounding concrete.

The cost of supplying special tie-rods as well as the filling of cavities left by the tie-rod cones shall be included in the rates tendered for formwork under the appropriate payment items.

On no account shall formwork be secured to reinforcing bars.”

## **CONSTRUCTION (5)**

### **Reinforcement (5.1)**

#### ***Bending (5.1.1)***

*Add to the sub-clause:*

“Reinforcement shall be cut with cropping or shearing equipment only. Cutting torches shall not be used.”

#### ***Fixing (5.1.2)***

*Add to the sub-clause:*

“No welding of reinforcement will be permitted.”

### **Formwork (5.2)**

#### ***Classification of Finishes (5.2.1)***

*Delete Clause 5.2.1(b) and replace with:*

“This finish shall be obtained by the use of steel-faced forms arranged in a regular pattern to fit the appearance of the structure. After stripping, all small fins, bulges and other projections shall be removed, surface honeycombing, surface discolorations and other irregularities repaired and the surface rubbed to form a smooth finish of uniform texture and colour. The finish shall be to Degree of Accuracy 1 tolerances defined in Clause 6.2.2 and 6.2.3.”

*Add to the sub-clause 5.2.1 (c):*

“The quality of the formwork to the external surfaces shall fall within the "Special" category and shall be such that no after-treatment e.g. rubbing down, other than the sealing of ferrule holes (which themselves shall be placed with precision in a regular pattern) will be necessary. The formwork used shall be unblemished and erected in a regular pattern so that the joints shall be a feature of the finished surface which shall be to Degree of Accuracy 1 tolerances as defined in Clauses 6.2.2 and 6.2.3.”

#### ***Removal of Formwork (5.2.5.2)***

*Rephrase the first two lines to read:*



“For this purpose and except as allowed in 5.2.5.3, the formwork shall remain in place, after all the concrete has been placed in the relevant lift, for the appropriate minimum period of time given in Table 2.”

### **Holes, Chases and Fixing Blocks (5.3)**

*Add to this sub-clause:*

“Fixing blocks for the attachment of fixtures may be embedded in concrete if the strength or any other desirable feature (such as appearance) is not, in the opinion of the Engineer, impaired thereby.”

### **Chamfers (New sub-clause 5.5)**

“Unless otherwise noted on the drawings, all exposed corners and arises shall be chamfered 25 x 25 mm.”

### **Concrete (5.5)**

#### **Quality (5.5.1)**

##### **Consistency (5.5.1.2 (b))**

*Delete the paragraph (b) and substitute the following:*

“(b) by the Engineer in respect of prescribed mix and strength concrete, or”

##### **Durability (5.5.1.5)**

*Add to the sub-clause:*

“The exposure conditions at the site of the works are to be considered as being severe.”

##### **Prescribed Mix Concrete (5.5.1.6)**

*Delete the fourth to tenth lines inclusive from the sub-clause and substitute the following:*

“The grades of prescribed mix concrete are designated Grades 20, 15 and 10 and are composed of cement, sand and stone, as specified herein before, proportioned as listed in the accompanying table.

<b>Grade (MPa)</b>	<b>Size of stone (mm)</b>	<b>Cement (kg)</b>	<b>Sand (m<sup>3</sup>)</b>	<b>Stone (m<sup>3</sup>)</b>
20	19	50	0.11	0.14
15	19	50	0.13	0.16
10	37.5	50	0.16	0.22

While the proportion of cement to the combined quantity of sand and stone must remain constant for each grade of concrete, as set out in the table, the relative proportions of sand and stone are to be adjusted if required by the Engineer, so as to attain the most suitable consistency of concrete, due allowance being made for the bulking of sand due to moisture.

The addition of water shall be regulated by the use of properly calibrated containers, only sufficient water being added as will in the opinion of the Engineer, afford a workable mix.

The fine and coarse aggregate approved for use in strength concrete Grades 30 and 25 are to be used for prescribed concrete mixed Grades 20 and 15.

### ***Strength Concrete (5.5.1.7)***

*Replace the contents of the sub-clause with:*

“The grades of strength concrete are designated Grades 30 and 25 and are composed of cement, sand and stone, as specified herein before, proportioned as listed in the accompanying table.

<b>Grade (MPa)</b>	<b>Size of stone (mm)</b>	<b>Cement (kg)</b>	<b>Sand (m<sup>3</sup>)</b>	<b>Stone (m<sup>3</sup>)</b>
30	19	50	0.080	0.110
25	19	50	0.095	0.125

The concrete mixes for Grade 30 and 25 concrete shall be designed by the Portland Cement Institute’s laboratory nearest to the site of the Works, or another competent laboratory approved by the Engineer. At least three weeks before placing any strength concrete on the Works, the Contractor shall supply and deliver to a laboratory at his own cost, samples of the aggregates he proposes to use in the strength grade concrete. While the proportion of cement to the combined quantity of sand and stone must remain constant for each grade of concrete, as set out in the table, the relative proportions of sand and stone may be adjusted to achieve the requirements of this Specification.

### ***Mixing (5.5.3)***

#### ***Ready Mixed Concrete (5.5.3.2)***

*Delete the first sentence and substitute the following:*

“Concrete produced at a central concrete production facility other than at the site of the Works shall only be accepted for use in the Works with the prior and express approval of the Engineer. When such approval has been given, the Engineer shall then decide whether or not to accept the test results obtained by the facility concerned.”

### ***Placing (5.5.5)***

#### ***Dropping Concrete Freely (5.5.5.5)***

*Replace the contents with:*

“Dropping concrete freely will only be permitted if the Engineer is satisfied that this is the only practical method of placing.”

#### ***Pumping of Concrete (5.5.5.9)***

*Delete the sub-clause 5.5.5.9 and substitute the following:*

“The placing of concrete by pumping will not be permitted.”

#### ***Blinding Layer (New sub-clause 5.5.5.10)***

“Beneath all structural grades of concrete or elsewhere, if so ordered by the Engineer, or shown on drawings, the bottom of the excavation is to be covered by a blinding layer (screed) in Grade 15/19

concrete to a depth of 75 mm to prevent disturbance of the ground and to serve as an even and accurate positioned working floor for setting steel and placing foundation concrete. This blinding layer shall be laid immediately after excavations have been taken out and trimmed to the required depths and have been inspected and approved by the Engineer.”

### ***Construction Joints (5.5.7)***

#### ***General Preparation of Construction Joints (5.5.7.3)***

*Delete sub sub-clauses (a), (b), (c), and (d) and substitute the following:*

- “a) All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles and shall be prepared to the satisfaction of the Engineer. 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.
- b) The Contractor shall provide a compressor 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.
- c) “Blowing off” may generally be carried out on horizontal surfaces but under special circumstances approved by the Engineer, it may also be carried out on vertical surfaces. The surface concrete to be prepared shall be between 4 and 8 hours old after completion of placing and shall be blown off using a mixture of air and water under a pressure of at least 500 kPa 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 (dependent on the type of cement) so that the concrete has set to just the necessary degree of hardness. The operation may therefore have to be undertaken outside normal working hours and at night. When the surfaces are at least 12 hours old, any remaining loose fine aggregate particles shall be washed off.
- d) “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. 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.
- e) All surfaces either prepared, by “blowing-off” or by “scabbling”, shall be kept continuously wet until the next lift of fresh concrete is to be placed against them; the minimum time being 12 hours.

- f) 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.”

***Placing Fresh Concrete at Joints (New sub-clause 5.5.7.4)***

- “a) Vertical construction joint surfaces shall be, as instructed by the Engineer, either smooth, clean and kept damp for at least 24 hours before placing fresh concrete against them, or scabbled, cleaned and dampened as specified above.
- b) Horizontal construction joint surfaces shall have been “scabbled” or “blown off”, cleaned and kept continuously wet as specified above before fresh concrete is placed over them. Immediately before placing the fresh concrete, the damp surface of the set concrete shall be evenly coated (by brushing or brooming) with a layer of cement mortar between 10 mm and 15 mm thick. The water/cement ratio and the cement/sand ratio of this mortar shall be the same as that of the fresh concrete to be placed and the mortar shall be produced by leaving the coarse aggregate fraction out of a batch of the fresh concrete. Coating with mortar is to be done in stages immediately before areas of set concrete are covered with fresh concrete, so that no mortar is exposed for longer than one hour after mixing, or less if the mortar has become dry or has started to set before being covered with fresh concrete. Any dried out mortar shall be removed and, after cleaning the surface, shall be replaced with fresh mortar.
- c) 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 top 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 top layer of concrete is between 2 and 12 hours old after mixing.”

***Curing and Protection (5.5.8)***

*Add to the sub-clause:*

“Notwithstanding the acceptable methods of curing itemised under (a) to (c) of the sub-clause, the walls of thin-wall reservoirs or other structures shall be subjected to continuous spray curing for a minimum period of 7 days.”

*Delete from the sub-clause all references to the curing periods relating to concrete made with Portland Blast Furnace Cement since the use of the latter is not permitted in terms of the Contract.*

***Adverse Weather Conditions (5.5.9)***

***Hot Weather Concreting (5.5.9.2)***

*Add to the sub-clause:*

“When concrete operations are being carried out at ambient temperatures in excess of 32°C, the Contractor shall apply the relevant recommendations for hot weather concreting set out in PCI 305 “Recommended practice for hot weather concreting.”

### ***Concrete Surfaces (5.5.10)***

#### ***Unformed Concrete Surfaces (5.5.10.2)***

*Add to the sub-clause:*

"All unformed concrete surfaces shall be finished to one or more of the following classes of finishes:

a) Class 1: Screeded Finish

Immediately after being poured the concrete shall be screeded with a straight edge working between templates set accurately to line and level. No mortar shall be added to overcome surface irregularities. These shall be made good by re-screeding or by the addition of concrete.

b) Class 2: Wood Floated Finish

After screeding to line and level and when the water sheen has disappeared, the concrete surface shall be trowelled by hand with a wood float to a uniform consolidated surface free from any trowel marks and uniform in texture and appearance.

c) Class 3: Steel Trowelled Finish

Commence as for Class 2 and finish with a steel trowel. The final finish shall be done at the correct time, for example, while the concrete is still sufficiently plastic to take polish but when it has hardened sufficiently to prevent drawing water and fine materials to the surface. Any adherence of mortar to the steel trowel indicates that the correct stage has not yet been reached."

#### ***Tolerances (New sub-clause 5.5.10.4)***

"a) Surface Class 1 shall not vary by more than 6 mm measured from a 3 m straight edge placed anywhere on the surface.

b) Surface Class 2 and 3 shall not vary by more than 3 mm measured from a 3 m straight edge placed anywhere on the surface.

c) Special surfaces such as bearing seats shall be finished to a higher degree of accuracy, as shown on the drawings."

#### ***Watertight concrete (5.5.11)***

*Add the following:*

"All water retaining structures are to be subjected to a water tightness test. No vertical or inclined construction joints of any kind will be permitted in the perimeter walls of water retaining structures unless these have been specially ordered or authorised by the Engineer.

All water retaining structures shall be subjected to a watertightness test prior to backfilling around the structures. After the structures have reached their design strength, they shall be slowly filled with clean water at a rate not exceeding 2 metres depth per 24 hours to their normal maximum water level. After allowing a further 24 hours for takeup by the concrete surfaces, the rate of leakage shall be measured by a hookgauge to be provided by the Contractor. If the rate of leakage exceeds 2 litres per

square metre of water surface area per 24 hours and there is no prospect, in the opinion of the Engineer, of the rate of leakage improving, the Contractor shall take remedial steps as specified by the Engineer. The cost of any remedial steps required will be for the Contractor’s account.”

**Concrete for Watertight concrete (New sub-clause 5.5.11.1)**

Add new sub-clause:

“Grade 35 MPa /19 mm concrete shall be used for the construction of all water retaining structures.”

**Pipes and Conduits Embedded in Concrete for Watertight Retaining Structures (New sub-clause 5.5.11.2)**

Add new sub-clause:

“Except with the approval of the Engineer, no pipes other than those shown on the drawings shall be embedded in the concrete.”

**Disinfection of Water Retaining Structures (New sub-clause 5.5.11.3)**

Add new sub-clause:

“Before filling each water retaining structure for the first time with water, it shall be swept thoroughly clean. While the structure is being filled with water, a sodium hypochlorite solution shall be dosed to achieve a theoretical total chlorine concentration of 25ppm.

Once the structure has been filled with water, it shall be left for a 24 hour period. Thereafter, total chlorine concentration shall be measured. A concentration of 20ppm total chlorine will be considered acceptable. Should such concentration not be achieved, the Contractor shall carry out, at his own cost, all steps deemed necessary by the Engineer to achieve satisfactory disinfection.

Once satisfactory disinfection is achieved, the structure shall be drained and sufficient sodium thiosulphate (typically 1 part/part of total chlorine) shall be dosed into the system to fully neutralise the chlorine before discharging.

The structure shall then be filled and after 24 hours, samples will be taken by the Engineer for analysis (the Contractor shall allow for the cost of these tests within his tendered rate). Should the following limits not be achieved, the Contractor shall carry out, at his own cost, all steps deemed necessary by the Engineer to confirm satisfactory disinfection:

PARAMETERS	COUNT
E Coli	0
Coliforms	0
Faecal Streptococci	0

**Grouting (5.5.13)**

*Add to the sub-clause:*

“Grouting shall be done to the instruction of the Engineer using materials of suitable consistency as follows. Unless otherwise directed, grouting mixtures shall consist of one part cement to two 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 Engineer may direct the Contractor to replace a proportion of sand with fine stone to reduce shrinkage.”

***Liquid Grout (New sub-clause 5.5.13.1)***

*Add new sub-clause:*

Where liquid grout is required for bolt holes etc., water shall be added in such quantity that, when the material is thoroughly mixed and stirred, it shall flow readily so as to fill all recesses and air spaces in the work to be grouted. Before grouting any section of the work with liquid grout, the surfaces to receive grout shall first be thoroughly cleaned and flushed with water. The grout shall then be introduced in such a manner as to fill effectively all recesses. When the grout has set the surface of the work shall be finished off flush and smooth with cement mortar.

***Grouting of Pipes/Specials through Walls (New sub-clause 5.5.13.2)***

“Where entry holes for pipes / specials have been left 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:

- (a) Remove all shuttering and boxing remaining in the holes;
- (b) Make any alterations required to the position and shape of the holes;
- (c) Thoroughly clean the sides of the holes so as to obtain satisfactory bond surface for the new concrete; and
- (d) Free all surfaces of the pipes / specials of all coatings and thoroughly scrape and clean the pipes / specials.

After accurately positioning the pipes / specials in the respective holes, the Contractor shall fix the pipes / specials in the holes.

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 12 mm thick, of mortar consisting of three parts concrete sand and one 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, shall be vibrated in layers so as to obviate any failing away from pipe / special surfaces of the concrete already placed. The whole shall, when set, form a dense, homogeneous, and waterproof mass. A spare vibrator with an independent

power source shall be kept in readiness 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.”

***Dry-Packed Grout (New sub-clause 5.5.13.3)***

“When dry-packed grout is specified, under base plates 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 onto site in the manufacturer’s unopened containers and used strictly in accordance with the manufacturer’s instructions, which the Contractor shall not fail to obtain. If necessary, the Engineer may require the Contractor to undertake preliminary tests to check the behaviour of proprietary additives under the conditions prevalent on the site.”

***Epoxy Grout (Epoxy mortar type only) (New sub-clause 5.5.13.4)***

Add new sub-clause:

“The manufacturer’s instructions shall be observed when an epoxy grout is used.”

***Cement Mortar (New sub-clause 5.5.16)***

Add new sub-clause:

“Where cement mortar is specified for filling around pipes etc. water shall be added to obtain a firm paste, which can be worked with a trowel but is not fluid. Surfaces to receive mortar shall be well wetted and excess water allowed to drain, or be removed. The mortar shall be worked into place with a trowel or tamping rod, exposed surfaces floated off, covered with wet hessian for 24 hours, and allowed to harden without disturbance.”

***Joints (New sub-clause 5.5.16)***

***Fibreboard (New sub-clause 5.5.16.1)***

“Fibreboard shall be provided between concrete sections wherever shown on the drawings. Fibreboard shall be impregnated and treated with a special bituminous compound to protect it from weathering, e.g. “Flexcell”, as manufactured by Expandite (Pty) Ltd or a similar approved board of comparable composition, which shall be securely fixed in position to avoid distortion or displacement while concreting operations are in progress.”

***Expansion Joints (New sub-clause 5.5.16.2)***



“Joint recesses to receive sealing compound are to be formed to the dimensions and shapes indicated on the drawings. These recesses are to be formed with rough sides and so shuttered that the shuttering can be removed without any timber having to be left in the recesses. Shuttering shall be left in the joints until the joints are ready for priming and filling with sealant. After the removal of the shutters, joints shall be cleaned by mechanically operated wire brushes and shall be hacked and scabbled and all dust removed.”

***Sealing Joints (New sub-clause 5.5.16.3)***

“The sealing of the joints (contraction / movement) is to be carried out by the Contractor under the supervision of a representative of the specialist firm supplying the sealing compounds. The Contractor is to be responsible for supplying these approved materials, transporting them to site, storing and using them, as required, and providing all labour, tools, equipment and everything necessary to prime and fill the joints.

Before priming and pouring, the joints recesses are to be thoroughly cleaned and dried out, in which connection, the use of compressed air is stipulated, to the approval of the Engineer.

No sealing of joint recesses is to be carried out until at least 21 days after the adjacent concrete has been cast.

Every care shall be exercised by the Contractor to ensure that the work shall be carried out in accordance with the requirements of this specification and in strict conformity with any special instructions given by the manufacturers for the proper use and treatment of the sealing materials provided by them.”

***Bituminous Coatings to Earth Faces (New sub-clause 5.5.17)***

“All earth covered concrete surfaces shall receive two applications of an approved bituminous coating such as Ebsco E55 Bituminous Waterproofing Compound or similar approved.

The coatings shall be applied strictly in accordance with the manufacturer's instructions and shall be repaired to the satisfaction of the Engineer if damaged during backfill operations.”

**TESTS (7)**

**Testing (7.2.)**

***Laboratory Testing (7.2.3)***

*Add to the sub-clause:*

“The Contractor will be liable for all costs incurred in designing the concrete mixes and making structural concrete cubes and having these tested.”

**MEASUREMENT AND PAYMENT (8)**

**Measurement and Rates (8.1)**

**Reinforcement (8.1.2)**

Delete sub-clause 8.1.2.1 b).

Delete sub-clause 8.1.2.2 a) and replace with:

“a) Each reinforcement bar size and type will be separately scheduled. Additional splice lengths or swage type connections introduced at the Contractor's request shall not be measured and will be to the Contractor's account.”

Delete from the first line of sub-clause 8.1.2.3 a) "of nominal size 25 mm".

**Concrete (8.1.3)**

Delete sub-clause 8.1.3.1(b) and replace with:

“(b) No allowance will be made for concrete required to make up over-break in soft, intermediate or hard rock excavation. No payment will therefore be made for additional concrete or formwork, ordered in writing by the Engineer to replace over-break.”

Add to sub-clause 8.1.3.3 a):

“Any additional precautions required for adverse weather conditions shall be covered in the unit rate.”

Delete from the first line of sub-clause 8.1.3.3 (a) the words:

"the cost of the design of the mix in the case of strength concrete,"

Add the following new sub-clause after sub-clause 8.1.3.3. (d):

“(e) Separate items 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 the provision of concrete (made with ordinary Portland Cement unless otherwise so scheduled); mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, striking where necessary, together with the cost of all parts of formwork in contact with the concrete and the necessary bearers, struts, and other supports, plus the layout and plant necessary to erect and strike such formwork.”

**Scheduled Reinforcement Items (8.3)**

**Steel Bars (8.3.1)**

Delete “Unit: t” and replace with “Unit: kg”

**Bituminous Coating to Earth Faces (New sub-clause 8.9)**

“Bituminous Coating .....Unit:m<sup>2</sup>”

The unit of measurement of bituminous coating to concrete surfaces shall be the square meter of surface coated. The rate tendered shall provide for all materials, plant, tools, labour, etc., necessary for the satisfactory installation of the coating according to the manufacturers specifications.”

## **PSL Medium-Pressure Pipelines**

### **INTERPRETATIONS (2)**

#### **Abbreviations (2.4)**

"HDPe : High Density Polyethylene"

### **MATERIALS (3)**

#### **Steel Pipes, Fittings and Specials (3.4)**

##### ***Pipes of nominal bore up to 150 mm (3.4.2)***

Delete "shall be screwed" in the second and third lines, and replace with "shall be flanged to SANS 1123 Table 1600/3".

Add the following to this sub-clause:

"The pipes shall be 'normalized' or seamless steel pipes and shall be used with malleable cast iron fittings complying with the requirements of SANS (SABS 509) 14:1994/ISO 49:1994."

##### ***Pipes of nominal bore over 150 mm (3.4.3)***

Delete bullet point b) and replace with:

"b) the pipes shall be flanged to SANS 1123 Table 1600/3 and of 6 m length; and"

Add the following to this sub-clause:

"The pipes shall be 'normalized' or seamless steel pipes and shall be used with malleable cast iron fittings complying with the requirements of SANS (SABS 509) 14:1994/ISO 49:1994."

#### **Other Types of Pipe (3.7)**

##### ***uPVC pipes (3.7.1)***

Only Unplasticised Polyvinyl Chloride (uPVC) pipes shall be used. Unplasticised Polyvinyl Chloride (uPVC) pipes shall be in accordance with SANS (SABS) 966-1:2013. Minimum working pressure to be Class 9.

##### ***High Density Polyethylene Pipes (HDPe) (New sub-clause 3.7.3)***

High Density Polyethylene (HDPe) pipes shall be in accordance with SANS ISO 4427 in material grade PE 63. Minimum working pressure to be PN 10, Standard Diameter Ratio (SDR) 11 (equivalent to material grade PE 63, PN 10).

#### **Jointing material (3.8)**

##### ***Flanges and Accessories (3.8.3)***

Delete "SABS 1123 or BS 4504 : Part 1" in the fourth line, and replace with "SANS 1123, Table 1600/3".

Add to the sub-clause:

"c) Each bolt and nut set is to be supplied with two appropriately sized washers. When fitting the bolts and nuts, one washer is to be placed against each bolt and nut."

#### ***Loose Flanges (3.8.4)***

Add to the sub-clause:

"Bolts and nuts are to comply with SABS 136."

#### ***HDPe pipe couplings (New sub-clause 3.8.8)***

"All couplings to HDPe pipes up to be 16 bar rated compression fittings. Only compression fittings of the following brand names, or similar approved, will be acceptable: Philmac, Magnum, Plasson, Astore, Unidelta and Elprene."

### **Corrosion protection (3.9)**

#### ***Steel Pipes (3.9.2)***

##### ***Steel Pipes of Nominal Bore up to 150 mm (3.9.2.1)***

Delete the contents of this clause and substitute the following:

Corrosion protection of steel pipes of nominal bore up to 150mm shall conform to the requirements of **Particular Specification PC: Mild Steel Pipes and Fittings.**

##### ***Steel Pipes of Nominal Bore over 150 mm (3.9.2.2)***

Delete the contents of this clause and substitute the following:

Corrosion protection of steel pipes of nominal bore over 150mm shall conform to the requirements of **Particular Specification PC: Mild Steel Pipes and Fittings.**

##### ***Protection Against Electrolytic Corrosion (3.9.3)***

Delete the third line and substitute the following:

"tape or tape impregnated with a petroleum based material, or other approved insulating material, shall be applied in"

##### ***Flexible Couplings (3.9.4)***

Delete the contents of this clause and substitute the following:

"All flexible couplings shall be thoroughly wrapped with tape impregnated with a petroleum-based material."

##### ***Joints, Bolts, Nuts and Washers (3.9.5)***

Delete "hot-dipped bitumen coated" and replace with "hot-dipped galvanised".

***Valves (3.10)***

*Delete the contents of this clause and substitute the following:*

Valves shall comply with the requirements of **Particular Specification PB: Valves (Medium-Pressure)**.

**Manholes and surface boxes (3.11)**

***Bricks (3.11.1)***

*Delete the first sentence and substitute the following:*

"Bricks shall be obtained from an approved manufacturer and shall be either engineering bricks of minimum compressive strength 7MPa that comply with the applicable requirements of SANS (SABS) 227:2007 or concrete masonry blocks (390 x 190 x 190) of minimum compressive strength 3,5 MPa that comply with the applicable requirements of SANS (SABS 0400) 10400:1990 and SANS (SABS) 1215:2008."

***Sand (New sub-clause 3.12)***

"Sand used for mortar (general purpose) and for plaster (external) shall comply with the applicable requirements of SANS (SABS) 1090:2009."

***Cement (New sub-clause 3.13)***

"The cement used on the Works shall be CEM 1, grade 42.5 complying with the requirements of SANS (SABS EN 197-1) 50197-1:2000/EN 197-1:2000."

**CONSTRUCTION (5)**

**Laying (5.1)**

***Depths and cover (5.1.4)***

***General (5.1.4.1)***

*Add to this sub-clause:*

"Unless otherwise directed, all uPVC and HDPE pipes to be laid with their pipe markings facing upwards for ease of pipe type, size and class identification if/when exposed in the future."

**Valve and hydrant chambers (5.6)**

***General (5.6.1)***

*Replace "Drawing L-1" with "Typical Drawings".*

***Construction of Chambers (5.6.2)***

*Replace "Drawings L-1, L-2 and L-3" with "Typical Drawings".*

**Brickwork in Chambers and Manholes (5.8)**

*Delete the eleventh line and substitute the following:*

"Mortar for brickwork and plasterwork shall be composed of one part of cement to four parts of sand."

*Twelfth and thirteenth lines to be deleted.*

*Add to the sub-clause:*

"Plaster is to be applied in one coat not less than 12 mm in thickness."

### **Flanges and Accessories (New sub-clause 5.11)**

#### ***Bolted Connections (New sub-clause 5.11.1)***

"Bolted connections shall comply with the following:

- a) All steel pipes in diameter shall be flanged to SANS (SABS) 1123:2011, unless otherwise indicated on the drawings.
- b) All flanges shall be Type 3, plate flanges for welding and blank flanges shall be Type 8. 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 piping shall be thoroughly cleaned before connections are made.
- c) Bolts, tie-bolts and nuts shall be galvanised to SANS (SABS 763) 10684:2011/ISO 10684:2011 and shall comply with the relevant requirements of SABS 135:1985 and SABS 136:1985.
- d) The length of each bolt shall be such that after the bolt has been tightened, the end of the bolt shall not project beyond the nut by more than two threads. Tie-bolts on restrained couplings shall be fitted with "backing nuts".
- e) All bolt threads shall be liberally coated with "Copper slip" or similar approved prior to assembly. Upon completion, bolt heads and nuts shall be wrapped with the "Denso Mastic Blanket System" comprising of a priming solution, mastic blanket, petrolatum tape and lay-flat sheeting.
- f) 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 and external coating during transportation and during handling on site."

## **TESTING (7)**

### **Standard hydraulic pipe test (7.3)**

#### ***Water for Testing (New sub-clause 7.3.4)***

"The Contractor shall make his own arrangements for providing water for testing."

## MEASUREMENT AND PAYMENT (8)

### Scheduled Items (8.2)

#### *Anchor/Thrust Blocks and Pedestals (8.2.11)*

*Delete the last line and substitute the following:*

"formwork, concrete, reinforcement (if any), and screeding of top surfaces".

## **PSLB Bedding (Pipes)**

### **MATERIALS (3)**

#### **Bedding (3.3)**

*Add to the sub-clause:*

"The bedding for all flexible pipes laid under this Contract shall be as per Drawing LB-2 with joint holes (pockets) being provided in the bedding as shown on the drawing, at each pipe joint and coupling. No sharp-edged stones shall come into contact with either the pipes or the couplings (joints). No extra payment will be made for forming joint holes (pockets)."

#### **Selection (3.4)**

##### ***Suitable Material available from Trench Excavation (3.4.1)***

*Delete the sub-clause and substitute the following:*

"The excavation of a pipe trench shall comply with the requirements of sub-clause 5.4 of SANS (SABS) 1200 DB, and the provisions of sub-clause 3.7 of SANS (SABS) 1200 DB (in terms of which, for the purposes of providing bedding materials, the Contractor is not required to use selective methods of excavating) shall apply. Nevertheless, the Contractor shall take every reasonable precaution to avoid burying or contaminating material that is suitable and is required for bedding or covering the pipeline. If, in the opinion of the Engineer, bedding material can be produced from the excavated material, the Contractor if so ordered by the Engineer, shall screen or otherwise treat the excavated material in order to produce material suitable for bedding."

## **PLANT (4)**

### **CONSTRUCTION (5)**

#### **Concrete Casing to Pipes (5.4)**

*Add to the sub-clause:*

"Where concrete casing is ordered by the Engineer it is to be of 20/19 grade concrete with a minimum thickness of 150 mm above the top of the pipe".

## **MEASUREMENT AND PAYMENT (8)**

### **Principles (8.1)**

#### ***Volume of Bedding Materials (8.1.3)***

*Replace the sub-clause with:*

"The volume of bedding materials will be computed from:

- a) The outside dimensions of the pipe and the side allowance determined in accordance with sub-clause 8.2.3 of SANS 1200DB and as shown on Drawing LB-2, and



- b) The depth of each bedding section as shown on Drawing LB-2. No allowance will be made for bulking of material i.e. computed volumes are **compacted** bedding volumes to the above dimensions.
- c) The volume of the pipe will be deducted from bedding volume calculations.”

***Disposal of displaced material (8.1.5)***

*Replace the contents of this sub clause with the following:*

"Material displaced by the pipeline and by importation of material from sources other than trench excavation, shall be disposed of as specified in SANS 1200 DB - sub-clause 5.6.3."

## **PART 4: PARTICULAR PROJECT SPECIFICATIONS**

### **A) HEALTH AND SAFETY**

#### **SCOPE**

This specification covers general Health and Safety requirements specific to this project. The purpose of this specification is to assist the Contractor in preparing his Health and Safety Plan for the construction of the Works. As such, this specification must not be considered as a comprehensive Health and Safety manual covering all construction activities that could be expected to occur on the Works, but must rather be seen as a minimum requirement.

#### **REFERENCES**

##### **Legal Requirements**

The approach to Health and Safety on the Works shall be in accordance with the Occupational Health and Safety Act No. 85 of 1993, subject to the Construction Regulations 2014, hereinafter referred to as the Regulations.

These specifications shall be read in conjunction with the Supporting Specifications listed in PA 2.2 and contain revisions that will be deemed to satisfy this project.

##### **Supporting Specifications**

References made to Health and Safety in the documentation that comprise the Tender and Contract documentation for this project shall be read as part of this specification.

##### **Definitions**

Reference made in the Construction Regulations to the "Client" shall refer to the same representation as referred to in the project Tender or Contract documentation as the "Employer". Reference made in the Construction Regulations to "Principal Contractor" shall refer to the same representation as referred to in the project Tender or Contract documentation as "Contractor". Reference made in the Construction Regulations to "Contractor" shall refer to the same representation as referred to in the project Tender or Contract documentation as "Sub-Contractor".

#### **CONTRACTOR**

The Contractor accepted by the Employer for the construction of the Works under this contract, shall take on the responsibilities of the Principal Contractor as described above.

#### **SUB-CONTRACTORS**

The Contractor shall take on the responsibility to ensure that the Sub-Contractors comply with the Regulations.

## **CONTRACTOR'S HEALTH AND SAFETY PLAN**

The Contractor shall submit his Health and Safety Plan, required in accordance with Regulation 5(1), within 14 days after receiving a written appointment from the Employer for the Contract.

## **SUB-CONTRACTORS' HEALTH AND SAFETY PLANS**

No Sub-Contractor will be allowed to perform any work under this Contract until the Sub-Contractor's Health and Safety Plan has been approved by the Employer.

## **SUPERVISION OF CONSTRUCTION WORK**

Before any work commences on site, the Contractor shall submit to the Employer the name of the person or Contractor's employee, who will be the designated Construction Supervisor, as defined under Regulation 6(1). That person may assume the role of Construction Supervisor, in terms of the Regulations, for work performed by the Contractor's sub-contractors, subject to complying with the other sub-regulations under Regulation 6.

## **RISK ASSESSMENT**

### **General**

It will not be required for every Contractor to perform a risk assessment as required in Regulation 7(1). Where Sub-Contractors are appointed to perform work of a similar nature, trenching and pipe laying for instance, it will be deemed sufficient if a blanket risk assessment is performed for typical activities. The Contractor shall be responsible however, to make each Sub-Contractor aware of the blanket risk assessment before the Sub-Contractor commences working on site. The Contractor remains responsible to comply with Regulation 7

### **Health and Safety Committee/Representative**

The Contractor shall actively pursue the formation of a Health and Safety Committee representing all the people to be employed on site and the Labour Desk that will be established by the Employer to facilitate the employ of local labour, shall be invited to participate in the activities of the Health and Safety Committee.

## **FALL PROTECTION**

The necessary fall protection plan, training, medicals, appointments and equipment shall be compiled and implemented by the Contractor if any construction activities falling under this project could pose a potential "fall risk" as defined in the Regulations.

## **EXCAVATION WORK**

### **Excavation**

Excavation to depths exceeding 1.5 metres are a possibility on this project. If excavations of deeper than 1.5m are required, the Contractor will be required to implement all necessary precautions such as sloping the sides of the excavation or erecting shoring / bracing, all in accordance with the requirements of the Regulations.

## **WATER ENVIRONMENTS**

No work is expected to be executed in water environments under this contract.

## **HOUSE KEEPING AT CONSTRUCTION SITES**

The Contractor shall make adequate precautions to prevent diesel spillage at the Contractor's diesel storage and dispensing points, from contaminating the surrounding area.

## **CONSTRUCTION WELFARE FACILITIES**

### **General**

The requirement for sanitary facilities as required under Regulation 28 throughout the project shall apply.

### **Ergonomic Considerations**

The Employer's general requirements are that the design of the project and components thereof where possible, must take into account the ergonomics of the required task.

The Works requires the installation of heavy equipment, such as valves, steel pipe specials and the like, into underground chambers that are considered as confined spaces. All chambers where access is intended should be sized so that a person of average height and size can work inside with reasonable ease. To this end, the finished floor to soffit height in all accessible chambers should be not less than 1.7 meters, while the minimum size of accessible chambers should be 1.5 x 1.5 metres.

Accesses to chambers should be placed and sized for ease of access and for ease of installing the fittings required for the chamber.

The Contractor is required to scrutinise the designs presented to him for construction, for features that compromise the Ergonomic aspects of Health and Safety and bring potential problem areas to the attention of the Employer or the Engineer at least four weeks before construction of the particular feature. The problem area will then be attended to or, if the design cannot be altered, special precaution will be required or special steps taken to circumvent the problem.

If the Contractor fails to identify and/or notify the Engineer or Employer of any aspects that could affect Health and Safety ergonomically, in the required time beforehand, delays caused in rectifying these will be the Contractor's responsibility.

### **Confined Spaces**

Workers will not be required to work in confined spaces other than that created through trench excavation, and chamber construction as per PA13.2. The Contractor shall comply with all the requirements of General Safety Regulation 5.

## **GENERAL HEALTH AND SAFETY REGULATIONS**

This specification contains regulations of a general nature that contribute to Health and Safety on site and are aspects of Health and Safety that the Contractor must note. The Employer or Engineer shall have the right to instruct the Contractor to comply with a Regulation, or any other Health and Safety related aspect not included in these General Regulations, if the Employer or the Engineer considers that a relevant action or situation could endanger the Health and Safety of a worker or workers.

### **Definitions**

"building work" means building work as defined in the General Administrative Regulations published under Government Notice R2206 of 5 October 1984;

"confined space" means an enclosed, restricted or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, or similar construction, equipment, machinery or object in which a dangerous liquid or a dangerous concentration of gas, vapour, dust or fumes may be present;

"fire-resistance" means the minimum period for which a building element or component will comply with the requirements for stability, integrity and insulation when tested in accordance with SANS 10177-2:2005;

"flammable liquid" means any liquid, which produces a vapour that forms an explosive mixture with air, and includes any liquid with a closed-cup flash point of less than 55°C;

"high-risk substance" means a substance listed in the Schedule to the General Administrative Regulations published under Government Notice R2206 of 5 October 1984, as amended from time to time;

"putlog scaffold" means a scaffold supported by a single row of standards and the structure in connection with which it is being used;

[Definition of "putlog scaffold" added by GN R1791 of 1988.]

"scaffold" means any temporary elevated platform and supporting structure used for supporting workers or materials or both;

[Definition of "scaffold" added by GN R1791 of 1988.]

"SANS 10177-2:2005: Part II" means the South African Bureau of Standards' code of practice entitled Fire Resistance Test for Building Elements, SANS 10177-2:2005;

"suspended scaffold" means a working platform suspended from supports by means of one or more separate suspensions from each support;

[Definition of "suspended scaffold" added by GN R1791 of 1988.]

"trestle scaffold" means a working platform supported on trestles, stepladders, tripods and the like.

[Definition of "trestle scaffold" added by GN R1791 of 1988.]

### **Personal Safety Equipment and Facilities**

- (1) Subject to the provisions of paragraphs (f), (g), (h) and (i) of regulation 5 of the General Administrative Regulations published under Government Notice R2206 of 5 October 1984, the Contractor and user of machinery shall make an evaluation of the risk attached to any condition or situation which may arise from the activities of the Contractor or user, as the case may be, and to which persons at a workplace or in the course of their employment or in connection with the use of machinery are exposed, and he shall take such steps as may under the circumstances be necessary to make such condition or situation safe.
- (2) Where it is not practicable to safeguard the condition or situation contemplated in sub-regulation (1), the Contractor or user of machinery, as the case may be, shall take steps to reduce the risk as much as is practicable, and shall provide free of charge and maintain in a good and clean condition such safety equipment and facilities as may be necessary to ensure that any person exposed to any such condition or a situation at a workplace or in the course of his employment or on premises where machinery is used is rendered safe.
- (3) Taking into account the nature of the hazard that is to be countered, and without derogating from the general duties imposed on Contractors and users of machinery by sub-regulations (1) and (2), the safety equipment and facilities contemplated in sub-regulation (2) shall include, as may be necessary-
  - a) suitable goggles, spectacles, face shields, welding shields, visors, hard hats, protective helmets, caps, gloves, gauntlets, aprons, jackets, capes, sleeves, leggings, spats, gaiters, protective footwear, protective overalls, or any similar safety equipment or facility of a type that will effectively prevent bodily injury;
  - b) waterproof clothing, high-visibility clothing, chemical-resistant clothing, low temperature clothing, chain mail garments, waders, fire retardant or flame-proof clothing, ice-jackets, or any similar safety equipment of a type that will effectively protect the wearer thereof against harm;
  - c) belts, harnesses, nets, fall arresters, life lines, safety hooks, or any similar equipment of a type that will effectively protect persons against falls;
  - d) mats, barriers, locking-out devices, safety signs, or any similar facility that will effectively prevent slipping, unsafe entry or unsafe conditions;
  - e) protective ointments, ear-muffs, ear-plugs, respirators, breathing apparatus, masks, air lines, hoods, helmets, or any similar safety equipment or facility of a type that will effectively protect against harm;

- f) suitable insulating material underfoot where persons work on a floor made of metal, stone, concrete or other similar material; and
  - g) generally, such safety equipment or facilities as may be necessary to render the persons concerned safe.
- (4) The Contractor or the user of machinery, as the case may be, shall take steps to ensure that no safety equipment or facility provided as required by this or any other regulation is removed from a workplace or from premises where machinery is used, except for purposes of cleaning, repair, maintenance, modification, mending or replacement, and no person shall remove any such safety equipment or facility from a workplace or premises where machinery is used, except for the aforesaid purposes.
- (5) The Contractor shall instruct his employees in the proper use, maintenance and limitations of the safety equipment and facilities provided.
- (6) The Contractor shall not require or permit any employee to work unless such an employee uses the required safety equipment or facility provided in terms of this or any other regulation.
- (7) The provisions of this regulation shall not be construed as derogating from the provisions of any specific regulation prescribing specific safety equipment or facilities.

#### **First Aid, Emergency Equipment and Procedures**

- (1) The Contractor shall take all reasonable steps that are necessary under the circumstances, to ensure that persons at work receive prompt first aid treatment in case of injury or emergency.
- (2) Where more than five employees are employed at a workplace, the Contractor of such employees shall provide a first aid box or boxes at or near the workplace which shall be available and accessible for the treatment of injured persons at that workplace.
- (3) Taking into account the type of injuries that are likely to occur at a workplace, the nature of the activities performed and the number of employees employed at such workplace, the Contractor shall make sure that the first aid box or boxes contemplated in sub regulation (2) contain suitable first aid equipment which include at least the equipment listed in the Annexure hereto. The Contractor shall further make sure that only articles and equipment contemplated here or other similar equipment or medicine is kept in the first aid box or boxes.
- (4) Where more than 10 employees are employed at a workplace, the Contractor of such employees shall take steps to ensure that for every group of up to 50 employees at that workplace, or in the case of a shop or an office as contemplated in the Basic Conditions of Employment Act, 1983 (Act No. 3 of 1983), for every group of up to 100 employees, at least one person is readily available during normal working hours, who is in possession of a valid certificate of competency in first aid, issued by-
- a) the SA Red Cross Society;

- b) the St John's Ambulance;
  - c) the SA First Aid League; or
  - d) a person or organisation approved by the chief inspector for this purpose.
- (5) The Contractor shall at a workplace where a high-risk substance or toxic, corrosive or similar hazardous substances are used, handled, processed or manufactured, ensure that the first aid worker contemplated in sub regulation (4) is trained in the first aid procedures that are necessary for the treatment of injuries that may result from such activities, including the acute detrimental effects of exposure to such substances, and in the emergency procedures which are necessary in the case of accidental leakage or dumping of such substances.
- (6) The Contractor shall affix a prominent notice or sign in a conspicuous place at a workplace, indicating where the first aid box or boxes are kept as well as the name of the person in charge of such first aid box or boxes.
- (7) An employee with an open wound, cut, sore or any similar injury, who works in a workplace where a substance contemplated in sub regulation 5 is used, handled, processed or manufactured, shall report such injury to his Contractor forthwith. The Contractor may not permit such employee to continue working before the injury has been cleaned with soap and water or with a diluted disinfectant.
- (8) Where any employee is exposed or can be exposed to a potential hazard of injury to the eye through contact with a biological or chemical substance, the Contractor concerned shall make sure that there is an eye-wash fountain in the immediate vicinity of the workplace of such employee and that the employee is trained in the use thereof.
- (9) Where an employee at a workplace is exposed or can be exposed to a potential hazard of injury to or absorption through the skin as a result of sudden contact with a large amount of toxic, corrosive, high risk or similar hazardous substance, the Contractor concerned shall make sure that there is a fast-reacting deluge-shower with clean water or a similar facility in the immediate vicinity of the workplace of such employee and that the employee is trained in the use thereof.

### **Use and Storage of Flammable Liquids**

- (1) The Contractor shall not require or permit any person to work in a place where the vapour of any flammable liquid is generated to such an extent that it constitutes an actual or potential fire or explosion hazard or endangers the safety of any person, unless the provisions of sub-regulation (2) to (12) of this regulation are complied with.
- (2) The Contractor shall not require or permit a flammable liquid to be used or applied other than in a room, cabinet or other enclosure specially constructed for this purpose of fire-resisting material, or in a place which, owing to its situation or construction or any other feature or circumstance, is of such a nature that-



- a) no fire or explosion hazard is, can or may be created thereat;
  - b) any vapour resulting from such use or application is efficiently dispersed and diluted into the atmosphere subject to the provisions of the Air Pollution Prevention Act, 1965 (Act No. 45 of 1965); and
  - c) no other workplace can or may be contaminated by such vapour.
- (3) The Contractor shall cause every room, cabinet or enclosure contemplated in sub-regulation (2) to be fitted with an efficient intake and exhaust ventilation system to remove any vapour there from and to prevent its re-circulation in a manner which may lead to the contamination of any other workplace or the creation of a fire or explosion hazard: Provided that, notwithstanding any other provision of this regulation, the Contractor shall provide every employee doing spraying with a respirator, mask or breathing apparatus of a type approved by the chief inspector, and that any such employee shall while spraying use such apparatus provided to him.
- (4) Where spraying is done in any room, the Contractor concerned shall ensure that the ventilation system contemplated in sub-regulation (3) complies to the following requirements:
- a) If the air supply and extraction is horizontal, the average air speed measured at a level of 1.5 metres above the floor, or at the level of the platform on which persons stand to work, shall not be less than 0.5 metres per second;
  - b) if the air supply is vertical and the extraction thereof is done through slits or a grill along the side walls at floor level, the average air speed measured at a level of 1.5 metres above the floor, or at the level of the platform on which persons stand to work, shall not be less than 0.4 metres per second; or
  - c) if the air supply is vertical and the extraction thereof is done through a grill over the whole of the floor area, the average air speed measured at a level of 1.5 metres above the floor, or at the level of the platform on which persons stand to work, shall not be less than 0.3 metres per second.
- (5) Where spraying is done into any cabinet or enclosure as contemplated in sub-regulation (2), the Contractor concerned shall ensure that the ventilation system contemplated in sub-regulation (3) complies with the following requirements:
- a) Where the area of the open face of the cabinet is not more than one square metre, the average speed of air movement through the said face shall not be less than one metre per second;
  - b) where the area of the open face is more than one square metre but less than two square metres, the average speed of air movement through the said face shall not be less than 0.75 metres per second; or
  - c) where the area of the open face is equal to or exceeds two square metres, the average speed of air movement through the said face shall not be less than 0.5 metres per second.

- (6) With regard to the ventilation system contemplated in sub-regulation (3) the Contractor shall cause-
- a) all ducts, trunks and enclosures of the system to be of fire-resistant material with a smooth interior finish and to be constructed in such a manner as to facilitate the cleaning thereof;
  - b) the system to be kept in operation during working hours as well as for at least the period of time thereafter that may be necessary to clear the vapour from the atmosphere of the room, cabinet or enclosure to below 25 per cent of the lower explosive limit of that vapour; and
  - c) the work to be so organised that the flow of air towards the intake of such ventilation system is not obstructed and draws the spray or vapour of the flammable liquid away from any employee operating the equipment.
- (7) With regard to any room contemplated in sub-regulation (2), the Contractor shall cause every such room-
- a) with a floor area exceeding 20 square metres to have at least two separate entrances at opposite ends of the room, which shall be fitted with doors opening outwards that cannot be locked; and
  - b) to be fitted with an inspection window of strengthened and shatterproof glass that cannot be opened.
- (8) The Contractor shall not permit-
- a) any fire, flame or naked light or anything which may generate static electricity or any other thing which may ignite a flammable liquid or its vapour, to be used in or taken into any room, cabinet or enclosure contemplated in sub-regulation (2) in which any such flammable liquid is used, sprayed or stored, and shall affix a suitable and conspicuous sign prohibiting any such act at all the entrances to any such room, cabinet or enclosure;
  - b) any person to, and no person shall, smoke in any place in which flammable liquid is used or stored, and the Contractor shall affix a suitable and conspicuous notice prohibiting such smoking at all the entrances to any such place; and
  - c) any process capable of causing sparks or fire, or the application of any heat for the drying of sprayed or treated articles, to take place in any room, cabinet or enclosure used for spraying, before the space or atmosphere has been cleared of all vapour.
- (9) With respect to any room, cabinet, or enclosure contemplated in sub-regulation (2), the Contractor concerned shall cause-
- a) discarded cotton waste, cleaning rags or similar material to be removed daily and safely disposed of;
  - b) only that quantity of flammable liquid needed for work on one day to be taken into or kept in such room, cabinet or enclosure: Provided that partially consumed stock may be stored in a properly marked, fireproof wall cabinet inside the workplace;
  - c) all drums, cans, canisters or similar containers holding flammable liquids to be kept tightly closed when not in actual use and, after their contents have been used up, to be removed from the workplace and safely disposed of daily; and

- d) every such room, cabinet or enclosure to be kept clean and all fans, ducts, trunks and enclosures of the ventilation system contemplated in sub-regulation (3) to be kept clean and in good working order: Provided that any cleaning, scraping or scouring shall be done with implements that cannot cause sparking if the concentration of the vapour exceeds 25 per cent of the lower explosive limit of that vapour.
- (10) The Contractor shall cause every flammable liquid store to be-
- a) separated by means of fire-resisting material with a fire-resistance of two hours from any room, cabinet or enclosure contemplated in sub-regulation (2);
  - b) constructed of fire-resisting material with a fire-resistance of two hours;
  - c) constructed in such a way that, in case of spillage, a volume of the flammable liquid in question equal to the quantity of flammable liquid ordinarily kept in store plus 10 per cent of that quantity, can be contained;
  - d) ventilated to the open air in such a manner that vapour cannot accumulate inside the store; and
  - e) clearly marked with a sign indicating that it is such a store and also indicating the amount of flammable liquid which may be stored therein.
- (11) Taking into account the construction and location of the premises in question and the quantity and types of flammable liquids involved, the Contractor shall install an adequate amount of efficient fire-fighting equipment in suitable locations in and around every building in which such substances are used, handled or stored, or as may be recommended by the fire chief of the local authority concerned.
- (12) The provisions of this regulation shall not be construed as applying to the use of flammable liquids in the course of or in connection with building work: Provided that every Contractor engaged in building work shall ensure that, where flammable liquids are used or applied at the workplace concerned, this is done in such a manner that no fire or explosion hazard is created, and that the workplace is effectively ventilated: Provided further that where the workplace cannot be ventilated effectively the Contractor shall provide every employee involved with a respirator, mask or breathing apparatus of a type approved by the chief inspector, and shall take steps to ensure that every such employee, while using or applying flammable liquid, uses the apparatus supplied to him.

### **Work in Confined Spaces**

- (1) The Contractor or user of machinery shall take steps to ensure that a confined space is entered by an employee or other person only after the air therein has been tested and evaluated by a person who is competent to pronounce on the safety thereof, and who has certified in writing that the confined space is safe and will remain safe while any person is in the confined space, taking into account the nature and duration of the work to be performed therein.

- (2) Where the provisions of sub-regulation (1) cannot be complied with, the Contractor or user of machinery, as the case may be, shall take steps to ensure that any confined space in which there exists or is likely to exist a hazardous gas, vapour, dust or fumes, or which has or is likely to have, an oxygen content of less than 20 per cent by volume, is entered by an employee or other person only when-
- a) subject to the provisions of sub-regulation (3), the confined space is purged and ventilated to provide a safe atmosphere therein and measures necessary to maintain a safe atmosphere therein have been taken; and
  - b) the confined space has been isolated from all pipes, ducts and other communicating openings by means of effective blanking other than the shutting or locking of a valve or a cock, or, if this is not practicable, only when all valves and cocks which are a potential source of danger have been locked and securely fastened by means of chains and padlocks.
- (3) Where the provisions of sub-regulation (2) (a) cannot be complied with, the Contractor or user of machinery shall take steps to ensure that the confined space in question is entered only when the employee or person entering is using breathing apparatus of a type approved by the chief inspector and, further, that-
- a) the provisions of sub-regulation (2) (b) are complied with;
  - b) any employee or person entering the confined space is using a safety harness or other similar equipment, to which a rope is securely attached which reaches beyond the access to the confined space, and the free end of which is attended to by a person referred to in paragraph (c).
  - c) at least one other person trained in resuscitation is and remains in attendance immediately outside the entrance of the confined space in order to assist or remove any person or persons from the confined space, if necessary; and
  - d) effective apparatus for breathing and resuscitation of a type approved by the chief inspector is available immediately outside the confined space.
- (4) The Contractor or user of machinery shall take steps to ensure that all persons vacate a confined space on completion of any work therein.
- (5) Where the hazardous gas, vapour, dust or fumes contemplated in sub regulation (2) are of an explosive or flammable nature, the Contractor or user of machinery shall further take steps to ensure that such a confined space is entered only if-
- a) the concentration of the gas, vapour, dust or fumes does not exceed 25 per cent of the lower explosive limit of the gas, vapour, dust or fumes concerned where the work to be performed is of such a nature that it does not create a source of ignition; or
  - b) such concentration does not exceed 10 per cent of the lower explosive limit of the gas, vapour, dust or fumes where other work is performed.
- (6) The provisions of this regulation shall mutatis mutandis also apply, in so far as they can be so applied, to any work which is performed in any place or space on the outside of and bordering

on or in the immediate vicinity of, any confined space, and in which place or space, owing to its proximity to the confined space, any hazardous article, oxygen-deficient atmosphere or dangerous concentration of gas, vapour, dust or fumes may occur or be present.

### **Work in Elevated Positions**

The Contractor shall not permit any person to work in an elevated position, and no person shall work in an elevated position, unless such work is performed safely from a ladder or scaffolding, or from a position where such person has been made as safe as if he were working from scaffolding.

### **Working in Danger of Engulfment**

- 1) The Contractor shall not require or permit any person to, and no person shall, enter any place from or into which solid or particulate material is being discharged where a danger exists of a person being engulfed by such solid or particulate material, unless-
  - a) such a person is provided with and properly uses a safety belt and rope;
  - b) at least one other person who has been properly instructed, is and remains in attendance outside such place to keep the persons therein under continuous observation in order to render assistance in case of emergency; and
  - c) the precautions prescribed by regulation 5 of these regulations are taken if dangerous gas, fumes, dust or vapour may be present in such a place.

### **Stacking of Articles**

- (1) The Contractor shall not permit the building of stacks, which consist of successive tiers, one on top of another, unless-
  - a) the stacking operation is executed by or under the personal supervision of a person with specific knowledge and experience of this type of work;
  - b) the base is level and capable of sustaining the weight exerted on it by the stack;
  - c) the articles in the lower tiers are capable of sustaining the weight exerted on them by the articles stacked above them;
  - d) all the articles which make up any single tier are consistently of the same size, shape and mass;
  - e) pallets and containers are in good condition; and
  - f) any support structure used for the stacking of articles is structurally sound and can support the articles to be stacked on it.
- (2) The Contractor shall not permit-
  - a) articles to be removed from a stack except from the topmost tier or part of that tier; and
  - b) anybody to climb onto or from a stack, except if the stack is stable and the climbing is done with the aid of a ladder or other safe facility or means.
- (3) The Contractor shall take steps to ensure that-
  - a) persons engaged in stacking operations do not come within reach of machinery which may endanger their safety;
  - b) stacks that are in danger of collapsing are dismantled immediately in a safe manner; and
  - c) the stability of stacks is not endangered by vehicles or other machinery or persons moving past them.

- (4) Unless a stack is otherwise supported, the Contractor shall take steps to ensure that tiers of stacked material consisting of sacks, cases, cartons, tins or similar containers-
- a) are secured by laying up articles in a header and stretcher fashion and that corners are securely bonded; and
  - b) are stepped back half the depth of a single container at least every fifth tier or that, alternatively, successive tiers are stepped back by a lesser amount: Provided that at least the same average angle of inclination to the vertical is achieved: Provided further that where the containers are of a regular shape and their nature and size are such that the stack will be stable, they may be stacked with the sides of the stack vertical if the total height of the stack does not exceed three times the smaller dimension of the underlying base of the stack.
- (5) Notwithstanding the provisions of sub-regulation (4), free standing stacks that are built with the aid of machinery may, with the approval of an inspector, be built to a height and in a manner permitted by the nature of the containers being stacked: Provided that-
- a) the stacks are stable and do not overhang; and
  - b) the operator of the stacking machinery is rendered safe as regards falling articles.

### **Welding, Flame Cutting, Soldering and Similar Operations**

- (1) The Contractor shall not permit welding or flame cutting operations to be undertaken unless-
- a) the person operating the equipment has been fully instructed in the safe operation and use of such equipment and in the hazards which may arise from its use;
  - b) effective protection is provided and used for the eyes and respiratory system and, where necessary, for the face, hands, feet, legs, body and clothing of persons performing such operations, as well as against heat, incandescent or flying particles or dangerous radiation;
  - c) leads and electrode holders are effectively insulated; and
  - d) the workplace is effectively partitioned off where practicable and where not practicable all other persons exposed to the hazards contemplated in paragraph (b) are warned and provided with suitable protective equipment.
- (2) The Contractor shall not permit welding or flame cutting operations to be undertaken in a confined space, unless-
- a) effective ventilation is provided and maintained; or
  - b) masks or hoods maintaining a supply of safe air for breathing are provided and used by the persons performing such operations.
- (3) The Contractor shall not permit electric welding to be undertaken in wet or damp places, inside metal vessels or in contact with large masses of metal, unless-
- a) the insulation of the electrical leads is in a sound condition;
  - b) the electrode holder is completely insulated to prevent accidental contact with current-carrying parts;
  - c) the welder is completely insulated by means of boots, gloves or rubber mats; and
  - d) at least one other person who has been properly instructed to assist the welder in case of an emergency is and remains in attendance during operations,

provided that the provisions of this sub-regulation shall not apply to a welding process where the maximum voltage to earth does not exceed 50 volts.

- (4) The Contractor shall not permit welding, flame cutting, grinding, soldering or similar work to be undertaken in respect of any tube, tank, drum, vessel or similar object or container where such object or container-
- a) is completely closed, unless a rise in internal pressure cannot render it dangerous; or
  - b) contains any substance which, under the action of heat, may-
    - i. ignite or explode; or
    - ii. react to form dangerous or poisonous substances,unless a person who is competent to pronounce on the safety thereof has, after examination, certified in writing that any such danger has been removed by opening, ventilating or purging with water or steam, or by any other effective means.
- (5) Where hot work involving welding, cutting, brazing or soldering operations is carried out at places, other than workplaces which have been specifically designated and equipped for such work, the Contractor shall take steps to ensure that proper and adequate fire precautions are taken.

### **Ladders**

- (1) The Contractor shall ensure that every ladder is constructed of sound material and is suitable for the purpose for which it is used, and-
- a) is fitted with non-skid devices at the bottom ends and hooks or similar devices at the upper ends of the stiles which shall ensure the stability of the ladder during normal use; or
  - b) is so lashed, held or secured whilst being used as to ensure the stability of the ladder under all conditions and at all times.
- (2) The Contractor shall not permit a ladder to be used if it-
- a) has rungs fastened to the stiles only by means of nails, screws, spikes or in like manner; or
  - b) has rungs which have not been properly let into the stiles: Provided that in the case of welded ladders or ladders of which the rungs are bolted or riveted to the stiles, the rungs need not be let into the stiles; or
  - c) has damaged stiles, or damaged or missing rungs.
- (3) The Contractor may not permit that-
- a) a ladder which is required to be leaned against an object for support be used which is longer than 9 m; and
  - b) except with the approval of an inspector, the reach of a ladder be extended by fastening together two or more ladders: Provided that the provisions of this sub regulation shall not apply to extension or freestanding ladders.
- (4) In the case of wooden ladders the Contractor shall ensure that-

- a) the ladders are constructed of straight grained wood, free from defects, and with the grain running in the length of the stiles and rungs; and
  - b) the ladders are not painted or covered in any manner, unless it has been established that there are no cracks or other inherent weaknesses: Provided that ladders may be treated with oil or covered with clear varnish or wood preservative.
- (5) When work is done from a ladder, the Contractor shall-
- a) take special precautionary measures to prevent articles from falling off; and
  - b) provide suitable sheaths or receptacles in which hand tools shall be kept when not being used.
- (6) The Contractor shall ensure that a fixed ladder which exceeds 5 m in length and is attached to a vertical structure with an inclination to the horizontal level of 75° or more-
- a) has its rungs at least 150 mm away from the structure to which the ladder is attached; and
  - b) is provided with a cage which-
    - i. extends from a point not exceeding 2,5 m from the lower level to a height of at least 900 mm above the top level served by the ladder; and
    - ii. shall afford firm support along its whole length for the back of the person climbing the ladder, and for which purpose no part of the cage shall be more than 700 mm away from the level of the rungs: Provided that the foregoing provisions of paragraph (b) shall not apply if platforms, which are spaced not more than 8 m apart and suitable for persons to rest on, are provided.

## Ramps

- (1) The Contractor shall ensure that every ramp-
- a) is constructed in accordance with accepted technical standards;
  - b) has a safety factor of at least two with respect to the load it is expected to carry: Provided that the design makes sufficient provision for the load on the ramp as a result of the turning, braking and acceleration of vehicles, if the ramp is used for vehicles; and
  - c) has an inclination to the horizontal level of not more than 34° or one vertical to one and one half horizontal.
- (2) The Contractor shall ensure that every ramp-
- a) the inclination of which renders additional foothold necessary, but in every case where the inclination is more than 14° or one vertical to four horizontal, is provided with stepping laths which-
    - i. are placed at suitable intervals; and
    - ii. extend the full width of the ramp: Provided that the stepping laths may be interrupted over a width not exceeding 230 mm to facilitate the movement of barrows; and
  - b) which is higher than 2 m and is provided on both sides with-
    - i. substantial guard rails which are at least 900 mm and not exceeding 1000 mm in height, and



- ii. toe-boards that are at least 150 mm high and so affixed that no open space exists between the toe-board and the ramp.

### **Scaffold framework**

- (1) The Contractor shall ensure that-
  - a) scaffold standards are properly propped against displacement and are secured vertically on firm foundations: Provided that putlog scaffolds shall incline slightly towards the structure;
  - b) steel scaffold standards with "heavy", "medium", "light" or "very light" platform loadings which shall not exceed 320, 240, 160 and 80 kg/m<sup>2</sup>, respectively, are spaced not more than 1.8 m, 2 m, 2.5 m and 3 m apart, respectively; and
  - c) wooden scaffold standards are spaced not more than 3m apart;
  - d) ledgers are spaced vertically not more than 2.1 m apart;
  - e) putlogs or transoms-
    - i. which do not support a platform, are spaced at the same distances as the distances prescribed in paragraph (b) in respect of scaffold standards;
    - ii. which support a platform, are spaced not more than 1,25 m apart if the platform is constructed of solid timber boards; and
  - f) every part of a wooden scaffold frame has a diameter of at least 75 mm or a section of similar strength.
  
- (2) The Contractor shall not permit a scaffold to be used unless it-
  - a) is securely and effectively braced to ensure stability in all directions;
  - b) is secured at suitable vertical and horizontal distances to the structure to which work is being done, unless it is designed to be completely free-standing;
  - c) is so constructed that it has a throughout factor of safety of at least two; and
  - d) is inspected at least once a week and every time after bad weather by a person who has adequate experience in the erection and maintenance of scaffolds, and all findings are recorded in a register or report book.
  
- (3) The Contractor shall not permit that-
  - a) a scaffold with a supporting wooden framework exceeds a height of 10 m; and
  - b) a scaffold is erected, altered or dismantled by or under the supervision of a person other than a person who has had the necessary training and experience of such work and who has been appointed by the Contractor in writing for this purpose.

### **Scaffold platforms**

- (1) The Contractor shall ensure that-
  - a) every plank of a solid wooden scaffold platform is at least 275 mm wide and 38 mm thick;
  - b) every plank which forms part of a scaffold platform is supported at distances not exceeding 1.25 m, and its ends are projected not less than 70 mm and not more than 200 mm beyond the last prop;
  - c) every plank of a scaffold platform is firmly secured to prevent its displacement; and

- d) every platform is so constructed as to prevent materials and tools from falling through.
- (2) The Contractor shall ensure that every scaffold platform-
  - a) with “heavy”, “medium”, “light” or “very light” platform loadings is not less than 1 125 mm and not more than 1 380 mm, not less than 1 125 mm and not more than 1 150 mm, not less than 900 mm and not more than 1 150 mm, and not less than 675 mm and not more than 1 150 mm, respectively, wide: Provided that where a platform is used only as a gangway, a platform width of 450 mm shall be sufficient;
  - b) which is more than 2m above the ground is on all sides, except the side facing the structure, provided with-
    - i. substantial guard rails of at least 900 mm and not exceeding 1 000 mm in height; and
    - ii. toe-boards which are at least 150 mm high from the level of the scaffold platform and so affixed that no open space exists between the toe-boards and the scaffold platform: Provided that if the toe-boards are constructed of timber, they shall be at least 25 mm thick;
  - c) is not more than 75 mm from the structure: Provided that where workmen must sit to work, this distance may be increased to not more than 300 mm; and
  - d) is kept free of waste, projecting nails or any other obstructions, and is kept in a non-slip state.
- (3) The Contractor shall not permit that a working platform which is higher than 600 mm be supported on a scaffold platform, and shall provide an additional guard rail of at least 900 mm and not exceeding 1 000 mm in height above every such working platform.
- (4) The Contractor shall ensure that convenient and safe access is provided to every scaffold platform, and where the access is a ladder; the ladder shall project at least 900 mm beyond the top of the platform.

### **Suspended scaffolds**

- (1) The Contractor shall ensure that the outriggers of each suspended scaffold-
  - a) are constructed of steel or any other material of similar strength and have a factor of safety of at least four with respect to the load it is to carry;
  - b) have an overhang of not more than 1,8m beyond the edge of the structure and are of such length that the counteracting length can be anchored securely;
  - c) are, otherwise than by means of weights at the inner-ends, properly propped, suitably spaced and firmly anchored: Provided that an inspector may grant permission that outriggers may be anchored by means of weights; and
  - d) are provided with stop or other effective devices at the outer-ends to prevent the displacement of ropes.
- (2) The Contractor shall ensure that the working platform of every suspended scaffold is suspended by-
  - a) pulley-blocks, sheaves, winches or hoists of the correct size for the ropes being used;

- b) at least two independent steel wire ropes in the case of a working platform which is not wider than 912 mm, and at least four independent steel wire ropes in the case of a working platform which is 912 mm and wider; and
  - c) steel wire ropes of which the factor of safety is at least ten with respect to the maximum load which each rope is to carry.
- (3) The Contractor shall ensure that-
- a) the hand or power-driven machinery used for the lifting or lowering of the working platform of a suspended scaffold is so constructed and maintained that an uncontrolled movement of the working platform cannot occur;
  - b) the machinery referred to in paragraph (a) is so situated that it is easily accessible for inspection;
  - c) the rope connections to the outriggers are vertically above the connections to the working platform; and
  - d) in the case of a working platform suspended by two ropes only, the connections of the ropes to the working platform are of such height above the level of the working platform as to ensure the stability of the working platform.
- (4) The Contractor shall ensure that the working platform of every suspended scaffold-
- a) is at least 456 mm and not exceeding 1.8 m in width;
  - b) is suspended as near as possible to the structure to which work is being done and, except when light work is being done, is secured at every working position to prevent horizontal movement between the working platform and the structure;
  - c) is on all sides, except the side facing the structure, provided with substantial guard rails of at least 900 mm and not exceeding 1 000 mm in height above the level of the working platform: Provided that in the case of a working platform suspended by two ropes only, the guard rails shall be on all sides; and
  - d) is on all sides provided with toe-boards which are at least 150 mm high from the level of the working platform and so affixed that no open space exists between the toe-boards and the working platform: Provided that if the toe-boards are constructed of timber, they shall be at least 25 mm thick.

### **Trestle scaffolds**

- (1) The Contractor shall not use a trestle scaffold, or permit it to be used, unless-
- a) it is soundly constructed of solid material; and
  - b) all reasonable precautionary measures have been taken to prevent the unexpected spreading of its supporting legs when it is in use.
- (2) The Contractor shall not use a trestle scaffold or permit it to be used, if it-
- a) is higher than 3 m; or
  - b) consists of more than two tiers.

### **Minimum Contents of a First-Aid Box**

- Item 1: Wound cleaner/antiseptic (100 ml).
- Item 2: Swabs for cleaning wounds.
- Item 3: Cotton wool for padding (100 g).
- Item 4: Sterile gauze (minimum quantity 10).
- Item 5: 1 Pair of forceps (for splinters).
- Item 6: 1 Pair of scissors (minimum size 100 mm).
- Item 7: 1 Set of safety pins.
- Item 8: 4 Triangular bandages.
- Item 9: 4 Roller bandages (75 mm x 5 m).
- Item 10: 4 Roller bandages (100 mm x 5 m).
- Item 11: 1 Roll of elastic adhesive (25 mm x 3 m).
- Item 12: 1 Non-allergenic adhesive strip (25 mm x 3 m).
- Item 13: 1 Packet of adhesive dressing strips (minimum quantity, 10 assorted sizes).
- Item 14: 4 First aid dressings (75 mm x 100 mm).
- Item 15: 4 First aid dressings (150 mm x 200 mm).
- Item 16: 2 Straight splints.
- Item 17: 2 Pairs large and 2 pairs medium disposable latex gloves.
- Item 18: 2 CPR mouth pieces or similar devices.

## **B) VALVES (MEDIUM-PRESSURE)**

### **SCOPE**

This specification covers the supply and installation of gate valves up to 600 mm diameter, air valves up to 150 mm diameter and reflux valves for use on pipelines transporting potable water.

### **INTERPRETATIONS**

#### **References**

##### ***Code of Practice***

The recommendations of SANS (SABS 0120) 10120-5 L have been incorporated into this specification as far as they are applicable.

### **MATERIALS**

#### **General**

Valves shall be of the types specified in the schedule or in the project specification and, unless otherwise required in terms of the project specification, they shall be capable of withstanding the applicable test pressures specified in Clause PB 7. All valves shall be supplied complete with coupling and jointing material.

Unless otherwise stated in the Bill of Quantities or otherwise not applicable, all valves shall be supplied with operating caps.

Satisfactory temporary end covers shall be provided to protect threads, flanges and prepared ends of valves from damage during transportation and handling on site.

Valves shall be so transported, stored and handled as to prevent damage. Valves damaged in any way shall be removed from the site.

#### **Durability of Valves**

The valves shall be suitable for use on domestic water reticulation in the area in which they are used and all materials utilised in the construction of the valves shall be resistant against corrosion from the water in the area.

#### **Gate Valves for Waterworks**

##### ***General***

All gate valves shall comply with the requirements of SANS (SABS) 664:2011 and shall carry the SANS (SABS) mark. The valves are to be cast iron fitted with non-rising spindles and all valves shall be of the resilient seal type except those that are fitted for scour purposes.

### ***Direction of Rotation***

Unless otherwise stated in the Bill of Quantities or project specification, the direction of spindle rotation for valve closing will be clockwise when viewed from above.

### ***Class of Valves***

Gate valves shall be of a class commensurate with a maximum working pressure as defined by the Engineer or as shown on the drawings.

### ***Valve Trim***

The valve trim shall be Type B, gunmetal trim, to SANS (SABS) 664:2011 i.e. gunmetal seats (body and gate), bronze spindle, and gunmetal spindle nut.

### ***Seat Rings***

The seating rings on valves up to and including 300 mm diameter shall be pressed into undercut recesses, machined into both the gate and valve body in such a manner that the permanent distortion of the seating ring prevents them from becoming loose.

For valves larger than 300 mm diameter, the gunmetal-seating ring shall be pinned into a rectangular recess machined in both the valve gate and body.

### ***Auxiliary Fittings***

Unless otherwise stated in the Project Specification, valves of 300 mm diameter and larger shall be fitted with the following auxiliary fittings:

#### ***Drain Plugs***

300 mm diameter valves and larger shall be supplied with gunmetal drain plugs screwed into the lowest point of the valve and the valve body shall be suitably drilled and tapped to accept the drain plug. The plug must be in position when the test pressure is applied.

#### ***Ball Bearing Thrust Collars***

300 mm diameter valves and larger shall be fitted with a ball bearing race fitted on the top and bottom of the thrust collars. The ball bearing races shall be totally enclosed in a grease packed cover, which shall be sealed to prevent the egress of grease. Provision shall be included for lubricating the ball races and the lubrication arrangement shall allow for greasing while the valve is under pressure.

***Spur Gearing***

Where considered necessary by the supplier, gate valves of 300 mm diameter and larger, shall be fitted with spur gearing and an indicator, clearly visible from above, to show the position of the valve gate. The spur gearing must be fitted with a cast iron cap. The gear ratios shall comply with the valves given in the table below.

Size of valve (mm)	Spur gear ratio	Size of valve (mm)	Spur gear ratio
300	2:1	450	3:1
350	2:1	500	3:1
375	2:5:1	525	3:1
400	2:5:1	600	3:1

***By-Pass Unit***

Valves of 300 mm diameter and larger shall be fitted with a by-pass valve, fitted either integral with the valve body or to suitable short double flanged tailpieces. All fittings used for the by-pass arrangement shall be capable of withstanding the test pressure of the main valve and shall comply with the conditions of this specification. By-pass sizes shall comply with the values given in the table below.

Size of valve (mm)	By-pass size (mm)	Size of valve (mm)	By-pass size (mm)
300	40	450	75
350	40	500	75
375	50	525	75
400	50	600	75

**Butterfly Valves*****General***

Buttery valves shall generally comply with the requirements of SANS (SABS) 1849:2008 – Butterfly Valves for General Purposes except where a specific product is specified.

The butterfly valves required for this project shall be the AMRI-KSB ISORIA 16 series (or similar approved) flanged or wafer type as detailed on the drawings or as scheduled. The valves shall be provided with ductile iron bodies, 13% Cr stainless steel shafts, stainless steel discs and shall be lined with special formulation E.P.D.M. lining.

**Air Valves**

All air valves shall be either 16 or 25 bar rated 50 mm, 80 mm or 100 mm dia "Vent-O-Mat" RBX double acting anti-slam air valves as shown on the drawings.

***Isolating Valves for Air Valves***

Air valves shall be provided and supplied complete with isolating valves of suitable pressure rating entirely reliable in operation for the shutting down of the air valve for its complete inspection and removal and replacement of the balls or other parts as required.

a)

he isolating valve shall either be 16 or 25 bar rated 50 mm dia lever operated ball valves to SANS (SABS) 1056-3:2012 or 16 or 25 bar rated 80 or 100 mm dia AVK or similar approved lever operated butterfly valves incorporated in the inlet stem to the air valve and jointed as specified or shown on the drawings.

b)

he direction of rotation of the isolating valve, unless otherwise stated in the Project Specification or Bill of Quantities, shall be clockwise closing, when viewed from above.

**Flanges**

Flanges shall be to the dimensions and drilled as for gate valves according to SANS (SABS) 664:2011.

**Reflux Valves*****General***

Unless otherwise specified, reflux valves shall be flange ended and shall comply with the requirements of SABS 144, Cast Iron Single Door Reflux Valves or SABS 192 Cast Steel Single Door Reflux Valves as applicable and shall bear the SABS mark.

***Class of Valve and Body***

The working pressure and class of valve shall be as stated in the Bill of Quantities or Project Specification and shall be according to the table below.

Class	Maximum working pressure	Body construction
10	1.0 MPa	Cast iron
16	1.6 MPa	Cast iron
25	2.5 MPa	Cast steel
40	4.0 MPa	Cast steel
100	10.0 MPa	Cast steel

***Flange Drilling***



Flanges shall be drilled and bolted according to the requirements of SABS 144 and SABS 192 as applicable. Precision bolts and nuts unless otherwise stated in the Project Specification are not required.

### ***Valve Trim***

The trim of reflux valves shall be as follows:

- a) Cast iron reflux valves shall have stainless steel trims;
- b) Cast steel reflux valves shall have stainless steel seats and stainless steel hinge pins.

### ***Finish***

All cast iron parts, except flange faces shall be thoroughly cleaned and an epoxy primer applied, followed by one or more coats of high-build epoxy material to give a total dry film thickness of at least 250 µm applied in conformity with the manufacturer's recommendations.

### **Knife Gate Valves**

#### ***General***

Knife gate valves shall be constructed according to SANS 664. All valves shall be "Wafer Type" Bi-Directional Cast Knife Gate Valves. Gate edges shall be machined, finished, and rounded. The gate faces shall be finish ground.

The valve shall be provided with a handwheel, unless otherwise specified. Handwheels for Classes 10 and 16 valves, shall be manufactured from cast iron and for Classes 24, 40 and 100, from cast steel.

Manually actuated valves 50-300mm diameter shall have handwheel actuators. Valves 350-900mm diameter shall be supplied with handwheel and bevel gear actuators.

Unless otherwise stated, the knife gate valves are to be the rising spindle type.

The valves shall be capable of being easily operated by one man, against the maximum, unbalanced pressure.

#### ***Class of Valve and Body***

Valves operating under working pressures up to PN10 and of diameter up to 350mm shall be constructed of cast iron unless otherwise specified.

Valves subject to working pressures up to PN16 and of diameter over 350mm, but not exceeding 600mm, shall be of cast iron and shall comply with the relevant requirements of SANS 664 unless otherwise specified.

Packing system shall fit a rounded machined packing chamber. The packing gland shall match the valve body. The fasteners shall be stainless steel.

Body shall be a one-piece casting of type 304 or 316 stainless steel.

Resilient seat shall be capable of bubble-tight bi-directional shutoff to the full pressure rating of the valve and provide shutoff on dead end service.

Valves shall be of a perimeter seat design and the seat shall provide guiding for the gate.

### ***Flange Drilling***

Flange drilling shall be in accordance SANS 1123-1000 or SANS 1123-1600.

### ***Direction of Rotation***

The direction of closing shall be clockwise.

## **PLANT**

In the assembly and coupling up of valves, correct tools and spanners of the correct size designed for the function they are to fulfil shall be used. The indiscriminate use of pipe wrenches will not be permitted and any fittings damaged by the use of incorrect tools shall be removed from the site.

## **CONSTRUCTION**

The applicable clause of SANS (SABS) 1200 L: Medium Pressure Pipelines shall apply unless otherwise stated in the Project Specifications.

## **TOLERANCES**

The dimensional tolerances specified in the following standard specifications shall apply:

SABS 144	Cast Iron Single-Door Reflux Valves
SANS (SABS) 664:2011	Cast Iron Gate Valves for Waterworks
SABS 192	Cast Steel Single-Door Reflux Valves

## **TESTING**

The testing of the various valves shall be according to the relevant SANS (SABS) specifications 144, 664, 192 and 128 for the works test.

Once installed in pipelines, the valves shall be subject to the same hydraulic tests and pressures specified for the pipelines.

## **MEASUREMENT AND PAYMENT**

The applicable clauses of SANS (SABS) 1200 L shall apply unless otherwise stated in the Project Specification.

## C) MILD STEEL PIPES AND FITTINGS

### STEEL PIPES & FITTINGS OF NOMINAL DIAMETER UP TO 250 MM

#### Scope

This specification applies to the fabrication, welding and galvanizing of mild steel pipes and fittings of nominal diameter up to 250 mm.

#### Fabrication

- a) All fabricated steel pipe of nominal diameter up to 250 mm to be manufactured using ASTM A106 (Standard Schedule 40) Seamless Pipes in conjunction with ASTM A234 Grade WPB butt weld fittings to ANSI B16.9 and BS1640 and welded in accordance with SANS 15614-1: 2007 and/or ISO 15614-1: 2004.
- b) The supply and installation of all steel pipe work to be in accordance with SANS 1200L.
- c) All steel pipe to have a minimum wall thickness of 4.5mm.
- d) All steel pipe work and fittings for welded assemblies/specials to be sand blasted internally and externally prior to – and after - being welded together (refer to PC 1.4 item a)).
- e) All gaskets to be full-faced "Klinger" or similar approved.
- f) Allowances have been made in pipe and fitting assembly lengths for 2mm spaces between flange faces for gaskets and 10mm spaces between the pipe end and flange face for flange adaptors.
- g) All pipe work and fittings dimensions to be checked on site and any discrepancies reported to the Engineer, prior to any installation/assembly taking place.
- h) All pipework, including puddle flanges, passing through brickwork or concrete walls or buried underground to be "Denso" wrapped, unless otherwise directed in writing.

#### Welding

The specification and qualification of welding procedures for metallic materials, including welding procedure tests, to be in accordance with **SANS 15614-1: 2007** and/or **ISO 15614-1: 2004**.

Apart from reference to the above, the following documentation is required prior to the evaluation of an offer to tender or prior to any welding taking place:

- a) A preliminary welding procedure specification.
- b) The qualification or appropriate range of qualifications of the welder or welding operator who undertakes the welding procedure.
- c) Documentation relating to the above, including a copy of a current certificate of competence and photograph of the welder or welding operator.

After the award of the tender, but prior to installing the initial batch of pipe work, the following must be presented to the Engineer for approval:

- a) A signed and numbered radiographic report and visual copy of the x-rays of at least two butt welds carried out on the initial pipe work. (Items to be numbered).

- b) All remaining welds to be supported by documentation relating to a solvent dye penetration test of each weld. (Both document and item to be numbered accordingly).

NB: The Engineer reserves the right to call for further radiographic procedures if deemed necessary. All further batches of pipe work must be accompanied by written proof of dye penetration tests of all welds.

### Galvanizing

- a) All welded assemblies to be sand blasted internally and externally prior to hot dip galvanizing. NB: This is in addition to the sandblasting of steel work and fittings prior to the welding procedure (refer to PC 1.2 item d)).
- b) All welds to be inspected and approved by the Engineer prior to hot dip galvanizing, unless otherwise directed in writing.
- c) All pipe work and fittings including bolts, nuts and washers to be hot dip galvanized to **SANS 121 - ISO 1461**.
- d) All nuts to be oversized to allow for hot dip galvanizing.
- e) All damaged hot dip galvanized surfaces, or all ends of pipes cut to suit on site, to be treated with "Zincfix" or similar approved epoxy repair coating, to manufacturer's specification.

NB: Documentation relating to the above must accompany each batch of galvanized pipe work and fittings delivered to site (each item to be listed).

It is also a recommendation that the galvanizer should be a member of the Hot Dip Galvanizers Association of Southern Africa. This allows the Contractor some recourse in the case of delays or rejection of items.

## STEEL PIPES & FITTINGS OF NOMINAL DIAMETER GREATER THAN 250 MM

### Scope

This specification applies to the fabrication, welding and galvanizing of mild steel pipes and fittings of nominal diameter greater than 250 mm.

### Fabrication

- d) All fabricated steel pipe work of greater than 250 mm ND to be Grade C carbon steel in accordance with SABS 719-2011.
- e) The supply and installation of all steel pipe work to be in accordance with SANS 1200L.
- f) Steel pipe wall thickness as specified in SANS 719, depending on pipe ND to be used. Minimum pipe wall thickness to be 4.5 mm.
- g) All steel pipe work and fittings for welded assemblies/specials to be sand blasted internally and externally prior to being welded together.
- h) All gaskets to be full-faced "Klinger" or similar approved.

- i) Allowances have been made in pipe and fitting assembly lengths for 3 mm spaces between flange faces for gaskets. For flange adaptors, spaces between the pipe end and flange face have been allowed in accordance with the manufacturer's specifications.
- j) All pipe work and fittings dimensions to be checked on site and any discrepancies reported to the Engineer, prior to any installation/assembly taking place.
- k) All pipework, including puddle flanges, passing through brickwork or concrete walls or buried below ground to be "Denso" wrapped, unless otherwise directed in writing.

### **Welding**

As per PC 1.3.

### **Linings and Coatings**

#### ***Surface Preparation***

- a) Remove all weld splatter, sharp edges and protrusions;
- b) Pipes and fittings to be in rust condition A to C of Swedish Standard SIS 05 5900. Pipes and fittings in rust condition D will be rejected.

#### ***Cleaning of Surface***

- a) Surfaces to be degreased with water based solvent degreaser in accordance with SANS 1244;
- b) Surfaces to be thoroughly washed with clean potable water to remove all residues and allowed to dry.

#### ***Blast Cleaning***

- b) Surfaces to be sand-blasted in accordance with Swedish standard SIS 05 5900 (or ISO 8501-1);
- c) The pipe surface shall not be contaminated by oil, grease or any other contaminants harmful to the lining and coatings process.

#### ***Pipe Lining***

- a) Pipe lining to be solvent-free epoxy in accordance with ANSI/AWWA C210-97 "Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water pipelines";
- b) The dry film thickness to be a minimum of 400 and a maximum of 600 microns and to be free from sags and runs.

#### ***Pipe Coating***

- a) Pipe coating to be solvent-free polyurethane in accordance with ANSI/AWWA C222-99 "Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings";
- b) The minimum dry film thickness of coating to be 2000 microns within a tolerance of -100 microns and + 1000 microns.

#### ***Damage to Linings and Coatings***

**Internal lining** - to be repaired with two-component solvent-free polyamide cured epoxy to same thickness as existing adjacent lining.

**External coating** – to be repaired with solvent-free polyurethane coating to same thickness as existing adjacent coating.

## L) BUILDING WORKS

### GENERAL

This specification covers the various construction activities associated with the erection of buildings which form part of this Contract. Building work shall be carried out in accordance with the National Building Regulations, SABS 0400, the applicable clauses of the SANS Standardized Specifications and the information contained in this specification. Work appurtenant to the erection of buildings such as earthworks, concrete work, structural steelwork etc. shall be carried out as specified in the appropriate standardized specifications and will be measured and paid for under those specifications.

### BRICKWORK, PLASTERWORK AND FLOOR SCREEDS

#### Materials

##### *Bricks*

Burnt clay bricks shall comply with SABS 227 and shall be of the class scheduled or shown on the Drawings.

All brickwork below ground shall be engineering bricks (ROK), 14 MPa in class 1 mortar (10 MPa) compressive strength. Brickwork in all superstructures shall be as specified on the drawings.

All load bearing bricks shall be 14 MPa bricks. Concrete bricks where approved by the Engineer, shall have a nominal compressive strength of 8 MPa. Satisfactory proof of the load-bearing capacity of the bricks offered shall be submitted before deliveries are made to the Site.

Air bricks shall be well-burnt terracotta and shall be free from cracks and blemishes and lined with copper mosquito gauze.

Three samples of each type of brick shall be submitted to the Engineer for approval. All subsequent deliveries shall be of a standard equal to or better than that of the approved samples.

##### *Cement*

Cement shall comply with the requirements of SABS 471 and shall be stored under cover. The use of Portland blast-furnace cement (PBFC) which complies with the requirements of SABS 626 will only be allowed if approved by the Engineer.

##### *Aggregate*

Fine aggregate shall consist of natural sand, or crushed rock or gravel, and shall be hard, clean and free from adherent coatings or other deleterious matter. Sand for plaster and mortar shall comply with the requirements of SABS 1090, whereas the aggregates for normal and granolithic floor screeds shall comply with the requirements of BS 1199 and BS 1201 respectively.

### ***Water***

Water shall be clean and free from clay, silt, oil, acid, alkali, organic or other matter which would impair the required strength and durability of the mortar, plaster or floor screed.

### ***Wall ties and brickwork reinforcement***

Wire ties shall be of galvanized steel of the single wire type for solid walls and either the "Butterfly" or Modified PWD type for hollow walls. Ties shall be of sufficient length to allow not less than 75 mm of each end to be built into brickwork or embedded in concrete.

Brickwork reinforcement shall be manufactured from hard drawn steel wire conforming to BS 785 and shall consist of two 2,8 mm diameter main wires with 2,5 mm diameter cross wires at 300 mm centres welded at intersections.

Brickwork reinforcement shall be lapped not less than 300 mm at end joints and for a length equal to the width of the widest reinforcement at intersections.

### ***Damp-proof sheeting***

Damp-proof sheeting shall comply with SABS 248, type FV for fibre felt, or SABS 952, type B for embossed polyethylene sheeting.

## **Construction of Brickwork**

### ***Cement mortar***

Cement mortar shall, unless otherwise specified, consist of one part Portland cement to four parts sand (1:4) by volume for foundation brickwork and one part Portland cement to six parts sand (1:6) by volume for superstructure brickwork. The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively, mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Cement mortar shall be used within two hours of adding water to the mix and shall not be used after two hours or if it has begun to set. Mortar shall be turned over frequently to prevent it from setting until it is used.



### ***Brickwork***

Dimensions of all the brickwork shall be set out and built as shown on the Drawings. Bricks shall be kept wet before laying and the top of brickwork shall be wetted before any further bricks are laid. Bricks shall be well buttered with mortar before being laid and all joints shall be thoroughly flushed up as the work proceeds. All joints to face brickwork shall be neatly made and key-drawn with a 6 mm key.

Brickwork shall be carried up in a uniform manner with no portion being raised more than 1 m above an adjacent portion. All perpend, quoins, etc, shall be kept strictly true and square and the whole properly bonded together.

Brickwork shall be built in stretcher bond or English bond as shown on the Drawings, and bats shall not be used except where required for the bond. All joints shall be 10 mm wide and four courses shall measure 340 mm.

All brickwork shall be constructed with galvanized brickwork reinforcement build-in at every fourth course in superstructure brickwork and every second course in foundation brickwork.

Brickwork for cavity walls and solid walls built in stretcher bond shall be tied with wall ties at 255 mm vertical and 690 mm horizontal in foundations and at 340 mm vertical and 690 mm horizontal in superstructure, and shall be staggered vertically. At openings, the ties shall be positioned not more than 300 mm apart along the periphery of the opening and 150 mm from the opening.

Face brickwork shall be kept perfectly clean and rubbing down of the brickwork shall not be allowed. Scaffold boards shall be turned back during heavy rain to avoid splashing. Soiled brickwork shall be cleaned at the Contractor's expense, and the cleaning method shall be approved by the Engineer.

### ***Reinforced brickwork***

Brickwork over door and window openings shall be reinforced with steel rods, welded or expanded mesh, etc. Reinforcement shall be placed in each course of brickwork for a minimum of four (4) courses or as shown on the Drawings. Reinforced brickwork shall continue at least 300 mm on each side of the openings.

Brick lintels shall be built upon rigid temporary supports left in position for not less than seven (7) days after brick-laying. Pre-stressed concrete lintels may be used where approved by the Engineer.

### ***Key for plaster***

Joints of all brickwork receiving plaster shall be raked out, or the brick surfaces shall otherwise be prepared with an acrylic slurry or any other approved bonding agent.

### ***Damp-proofing***

A damp-proof course shall be laid over the full width of all the walls at a minimum height of 150 mm above the final ground level or wherever else it may be required, and it shall be lapped for at least 150

mm at angles and joints. A damp-proof course shall also be laid and stepped up under all external sills.

### ***General***

Rough and fair cutting shall be performed as required, and the brickwork shall be fitted around any steel work. Face brickwork shall be carefully cut and fitted to suit fittings.

Chases shall be left or formed for edges of concrete floors, staircases, etc. Chases shall also be provided wherever they may be required for pipes, conduits, switch boxes, distribution boards, and the like. Joints shall be raked out for flashings

### **Plasterwork**

#### ***Plaster coats***

A plastered finish shall consist of a single coat, comprising one application of a 1:6 cement sand mixture with a wood or steel-float finish except where otherwise indicated.

#### ***Thickness***

The total thickness of the plaster finish shall be 13 mm minimum and 20 mm maximum.

#### ***Workmanship***

All plasterwork shall be finished smooth and ready to receive paint. Plaster shall be flush with the faces of all switch and plug boxes, the interiors of which shall be kept free from plaster. Plastered surfaces shall be plumb and jambs and reveals shall be formed square

The plasterer shall cut out and make good all cracks, blisters and other defects and leave the plasterwork, on completion, in a state which is acceptable to the Engineer

### **Floor Screeds**

Floor screeds shall have a mix proportion by mass consisting of one (1) part Portland cement and three (3) parts (1:3) fine aggregate. A minimum amount of water is to be used, but it shall be sufficient to allow adequate compaction.

Screeds shall be laid on clean hardened bases in panels not exceeding 14 m<sup>2</sup> and shall be steel-trowelled to a true and smooth finish. In monolithic construction, the panels shall not exceed 30 m<sup>2</sup>. Joints in screeds shall coincide as nearly as possible with joints in the bases. The thickness of screeds shall be as shown on the drawings or as directed by the Engineer.

The entire screed surface shall be free from loose or raised particles of aggregate, trowel marks or any irregularities, humps or depressions exceeding 5 mm when measured from a 3 m long straight edge. Screeds shall be cured for three (3) to seven (7) days as may be directed by the Engineer, and shall be protected from damage. No moisture-sensitive floor finish shall be laid on screeds unless a reliable moisture test shows that the screed is sufficiently dry to receive the covering.

## DOORS AND WINDOWS

### Materials

#### *General*

All steel and iron work shall be delivered clean and free from rust, pitting or other defects. Shop primers shall be applied before delivery and shall consist of a coat of red oxide paint, or any other approved antirust paint on all surfaces.

Unless otherwise specified, all materials shall conform at least to the appropriate SABS or BS standards where such standards apply to ironmongery, or steel, cast iron and any other related materials.

#### *Pressed-steel door frames*

Pressed-steel door frames shall comply with SABS 1129 and shall be manufactured from 1,6 mm thick mild-steel sheeting, pressed to the required shapes, properly mitred, welded and reinforced, with all welding neatly cleaned off.

Frames shall be of the widths required to suit the thickness of the walls into which they are built and shall be fitted with suitable tie bars and braces at the bottom. Three lugs to be built into the brickwork shall be provided on each jamb.

Rebates in frames and transoms for doors shall be of the widths required to suit the thicknesses of the doors and shall be fitted with a pair of approved steel butt hinges set flush into recesses in the frames. 4,5 mm thick reinforcing plates shall be welded to the backs of the frames at hinge positions.

Heads of frames over double doors shall be drilled where required to form keeps for bolts and shall be fitted with one rubber buffer for each leaf of the door.

Frames for single doors shall be fitted with approved chromium striking plates and an adjustable striking plate keeper boxed in at the back of the frame by a welded-on sheet-metal box. The frames shall be fitted with a minimum of two rubber buffers.

Frames shall be protected against twisting and damage during transit and erection.

#### *Pressed-steel doors*

Pressed-steel doors shall be manufactured from 1,6 mm thick steel plate. The doors shall be of standard design, pressed to shape with 40 mm reveals all round. The doors shall be strengthened with full-length vertical V-shaped or other approved sectional strengthening ribs projecting to the outer face. Two horizontal stiffening rails shall also be welded to the inner face of the doors.

A door shall be hung on a pair of 100 mm long steel butt hinges with loose pins. The leaves of the hinges shall be welded to both the door and the door frame, and a 1,6 mm thick steel plate shall be welded to the inner face of the door to protect the lock.

One leaf of double doors shall be fitted at the top and bottom with approved 150 mm cast brass barrel bolts in an approved manner and the other leaf shall be fitted with a lock, the striking plate of which shall be fixed to the first leaf.

Where indicated on the drawings, doors shall be fitted with louvred ventilation grills of approved design, backed with insect and vermin-proof gauze screening.

### ***Steel window frames***

All steel window frames shall comply with SABS 727 and shall be of the types and sizes shown on the Drawings.

Standard industrial types of steel window frame shall be constructed from rolled mild-steel industrial sections, 35 mm wide by 3 mm thick, with opening sections constructed from standard residential sections, 25 mm wide by 3 mm thick, welded at angles and properly jointed at intersections.

### ***Aluminium doors, windows etc.***

The Contractor for the manufacturing and installations of the aluminium doors and windows is to submit proof of AAAMSA membership and doors and windows shall comply with AAAMSA design criteria.

The following certificates shall be provided prior to commencement of site work:

- a) A copy of the relevant AAAMSA Performance Test Certificate from the manufacturer/contractor supplying the architectural aluminium product.
- b) A Certificate of Conformance confirming that anodizing or powder coating has been processed in accordance with SANS 999 and SANS 1796 respectively.
- c) A Certificate of Conformance confirming that glazing has been installed in accordance with SANS 10137, ensuring that safety glazing materials have been installed in the mandatory areas and that each individual pane of safety glazing materials has been permanently marked.
- d) A warranty from the manufacturer of the laminated safety glass and/or hermetically sealed glazing units guaranteeing the products against delamination and colour degradation for a period of not less than five years.

The successful tenderer shall provide full shop drawings for the approval by the Engineer prior to the manufacturing of any work.

### ***Door locks and handles***

All door locks shall comply with the requirements of SABS 4 and shall be of approved manufacture and pattern. All locks shall be supplied with two keys. Keys shall be distinctly numbered with consecutive numbers and each key shall be stamped with the same number as that of the lock which it controls. No two locks in any one building may have the same key.

External doors shall be fitted with master-keyed four-lever heavy duty mortice locks or cylinder locks as indicated.

All locks shall be properly installed and, after completion, striker plates shall be adjusted and the locks serviced.

Door handles shall be of cast zinc of approved manufacture and pattern.

### ***Miscellaneous fittings***

All retaining devices for doors and windows as well as fittings such as coat hooks, retaining hooks, etc shall be of solid brass unless otherwise indicated. All fittings shall be secured by screws or set screws of the same material and finish as the fitting.

Fittings to be fixed to plastered walls, masonry or floors shall be fixed direct by means of patent plastic or fibre plugs fitted into drilled holes.

Door stops shall be provided at every door and shall be 40 mm diameter rubber stops.

Patented precast concrete window surrounds or blocks shall be as scheduled in the bill of quantities.

### **Installation of Doors and Windows**

All built-in door and window frames shall be set straight, plumb and level, and shall operate to the satisfaction of the Engineer after fixing has been completed.

Fittings shall be either removed, or wrapped and protected from damage, until all rough trades have been completed.

## **GLAZING**

### **Materials**

#### ***Glass***

Glass shall comply with the requirements of CKS 55. The quality of all window glass shall be such that surface deterioration will not develop after glazing.

All glass shall be free from bubbles, waviness, scratches, stains or other imperfections.

Unless otherwise specified, sheet glass for glazing shall be flat-drawn clear glass of ordinary glazing quality and of the thicknesses indicated below:

For panes not exceeding 1,5 m<sup>2</sup> in area: 4 mm.

### ***Putty***

All putty shall comply with the requirements of SABS 680.

Putty shall not be too hard or soft or caked when used, and shall dry evenly without crazing or cracking. Defective putty shall be cut out and replaced by the Contractor at his own expense, and any broken glass shall also be so replaced and putty so repainted.

### **Glazing**

Glass shall be cut in panes to suit all glazed openings with sufficient clearance all round to prevent cracking by expansion, contraction or vibration. In all cases the glass shall be well bedded and back-puttied and installed as specified in SABS Code of Practice 0137. All putty shall be carefully trimmed, cleaned off and neatly finished off straight with smooth surfaces and sharp mitres. A paint primer shall be applied as soon as the putty has dried out sufficiently to prevent shrinkage cracks from forming. The entire glazing operation shall be cleaned before the premises are handed over for occupation.

## **CARPENTRY AND JOINERY**

### **General**

#### ***Materials***

All timber used for structural purposes shall be of merchantable grade and shall comply with the requirements of SABS 563 and SABS 1245. Structural timber shall be carefully selected and of the best quality, free from large or dead knots, shakes, waney edges or other defects. Purlins and bracing shall comply with the requirements of SABS 653. Finger-jointed structural timber shall comply with the requirements of SABS 096 and laminated timber with the requirements of SABS 1089. Hardwoods and softwoods for joinery shall comply with SABS 1099 and SABS 1359 respectively and suitable species shall be used for the various purposes.

Unless otherwise specified, all materials shall conform to the appropriate SABS or BS Specification where such standards exist for nails, screws, bolts, adhesives, etc.

#### ***Preservative treatment***

All structural timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SABS 05, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

#### ***Priming***

The jointing surfaces of all joints exposed to the weather and built-in portions of frames shall be thickly primed except where adhesives are specified. Carpentry and joinery items which are prepared for painting by the manufacturer, shall be knotted and primed before being dispatched to the Site. Primed surfaces shall be touched up where necessary during the progress of the work or where site adjustments have been made.

## **Carpentry Work**

### ***Scope of work***

Carpentry work shall be carried out in a manner consistent with good workmanship and in compliance with the Drawings.

The carpenter shall perform all cutting away and making good in attendance upon all other trades and he shall provide and maintain temporary coverings required for the protection of any finished work that might be damaged if left unprotected during the progress of the work.

### ***Dimensions***

Unwrought timber shall be as sawn and shall be to the dimensions and within the tolerances specified in the relevant SABS Standard Specifications mentioned in subclause PD 5.1.1.

### ***Jointing***

Unless otherwise specified, all joints shall be secured by means of a suitable type and a sufficient number of approved connectors. All joints shall be carefully made in such a way that they will not impair the strength and stiffness of the beams or members.

### ***Timber roof construction***

The plates, joists, rafters, purlins, bracing and other pieces used for the construction of the roof and trusses shall be of the dimensions, spacing and construction as shown on the Drawings.

All the joints in the framework shall be of the most appropriate type, accurately formed and adequately secured with fasteners as specified.

## **Joinery Work**

### ***Scope of work***

Joinery work shall consist of the manufacture, delivery to the Site, and fixing in the buildings, of all joinery shown on the Drawings.

Except where a special finish is specified, the Contractor shall have all stairs, landings, doors, shelves and other joinery work cleaned and scrubbed down and shall leave all his work in a good order to the satisfaction of the Engineer.

### ***Dimensions***

All wrought timber shall be sawn, planed, drilled or otherwise machined or worked to the correct sizes and shapes shown on the Drawings. Reasonable tolerances shall be provided at all connections between joinery works and the building structure to compensate adequately for any irregularities, settlements or any other movements.

### ***Manufacture***

The joiner shall perform all the necessary mortising, tenoning, grooving, matching, tonguing, housing, rebating and all the other works necessary for correct jointing. He shall also provide all metal plates, screws, nails and other fixings that may be necessary for doing the specified joinery work properly.

### ***Joints***

Where joints are not specifically indicated, they shall be the recognised forms of joints for each position. The joints shall be so made as to comply with Part 2 of BS 1186.

### ***Doors and frames***

Door frames, linings, panel doors, framed, ledged and braced doors, flush doors, sliding doors, etc. shall be supplied or made by the joiner and shall be installed, fitted or hung as detailed on the Drawings. All timber shall be wrought and prepared for oiling, staining, varnishing or painting.

### ***Skirtings, cornices etc.***

Skirtings, cornices etc. shall not be installed until after the wall coverings have been applied, the flooring laid and ceilings installed, unless otherwise specified.

### ***In-situ joinery***

In-situ joinery work shall not be executed until after all floor, wall and ceiling surfaces have been formed or constructed, unless otherwise instructed.

### ***Ceilings***

Ceilings shall, unless otherwise specified or scheduled, consist of plaster board or fibre-cement panels as shown on the Drawings and shall be nailed to the bracing or suspended from the roof structure. The panels shall be separated by exposed tees and insulated with a 50 mm thick fibreglass wool blanket where shown on the Drawings.

## **ROOF SHEETING AND ACCESSORIES**

Roof sheeting and accessories shall comply with and shall be measured and paid for under SABS 1200 HB. All sheeted roofs shall be as specified on the drawings.

## **PLUMBING**

### **Materials**



### ***General***

All materials shall be of the best quality and shall be approved by the Engineer before installation. Cracked, chipped, dented or faulty items or materials shall be replaced at the Contractor's expense. Glazed ceramic sanitary ware shall comply with the requirements of SABS 497 and all other materials shall comply with the standards as specified, scheduled or shown on the Drawings.

### ***Water closet (WC) suites***

WC suites shall unless otherwise specified or scheduled consist of a glazed vitreous china closet with an S or P trap and seat lugs, a 14 litre low-level matching flat-bottomed flushing cistern placed and fixed on the closet, or a suspended enamelled cast-iron cistern with the flush pipe connected to the flushing rim of the closet with rubber cone joints, and a solid heavy-duty plastic seat with cover, hinges and buffers.

### ***Urinals***

Urinals shall be of the type specified or scheduled, of glazed vitreous china, wall mounted, with an automatic or a manual flushing system, and chromium-plated fittings.

### ***Wash-hand basins***

Wash-hand-basins shall unless otherwise specified or scheduled be of glazed vitreous china or enamelled cast iron, wall mounted on a pair of cast-iron brackets, and fitted with chromium-plated fittings consisting of two taps, outlet and chain, and supplied with a plug and an anti-siphon trap.

### ***Sinks***

Sinks shall comply with the requirements of SABS 242 and shall be complete with cabinet, chromium-plated outlet, anti-siphon trap, plug, chain and two bib taps or one mixer tap, all as detailed or as scheduled.

### ***Pipes and tubing***

Cast-iron and steel pipes used in plumbing work shall comply with the requirements of SABS 746 and SABS 62 respectively. Copper tubing shall comply with the requirements of SABS 460 and malleable cast-iron fittings with SABS 509.

### **Construction**

Plumbing shall be carried out strictly in accordance with the Drawings and with the National Building Regulations, with specific reference to Government Notice R1875 dated 31 August 1979.

Steel pipes and their malleable cast-iron fittings shall be joined with red lead and hemp, lead pipes shall have wiped soldered joints, and cast-iron pipes shall be joined by caulking with hemp and metallic lead. Soil pipes from WC's shall have an internal diameter of at least 100 mm and shall be fitted with a pan connector and an access bend (or an access junction where a vent pipe is used), and carried through walls and into the ground for connection to the sewer. Vent pipes shall be fitted with approved balloon gratings. Waste pipes from basins and sinks shall have an internal diameter of at least 32 mm and shall discharge into gulleys. Bends for waste pipes shall incorporate cleaning eyes.

Cisterns, basins and sinks shall be connected to the pipe system with 12 mm diameter copper service pipes, and chromium-plated stopcocks shall be installed for isolation and maintenance purposes.

## **PAINTING**

### **General**

No paint shall be applied to any surface containing traces of dust, grit, grease, oil, loose rust, millscale or corrosion products of any kind or to any surface that is not free from moisture. Where necessary, surfaces shall be thoroughly washed to remove all traces of soluble salts and/or corrosive air-borne contaminants prior to painting, and the surfaces shall be dried and painted immediately thereafter.

Welding shall be completed in so far as it is possible before painting commences, but in cases where welding can be done only at a later stage, no paint shall be applied to within 75 mm of the proposed weld position unless otherwise specified. Welds and adjacent parent metal shall be abrasive blasted and/or ground and all contaminants such as flux shall be removed prior to painting.

Surfaces of members which are to rest on concrete or other floors or which will be otherwise inaccessible after erection shall receive the full paint system prior to erection.

Damaged paint areas on metal surfaces shall be cleaned, rust spots removed where applicable and the surrounding paint which is still intact shall be feathered for a distance of 20 mm beyond the damaged area.

Spot priming and repair shall consist of all the coats previously applied and shall overlap the damaged area.

Damaged galvanised areas shall be cleaned and any rust spots and any flakes of the coating surrounding the damaged area removed. The coating shall then be restored by zinc spraying or soldering, or painting with a zinc-rich paint, as may be approved by the Engineer.

Where the shop coat is allowed to age for a few months before the final painting is done, light sanding or rubbing with steel wool or scrubbing with clean water using a bristle brush shall be carried out. Steel to be embedded in concrete shall not be painted below 50 mm from the final level of the concrete. Each priming coat and each undercoat of paint shall be inspected and approved by the Engineer before any subsequent undercoat or finishing coat is applied.

All finishing colours shall be as shown on the Drawings, or as directed by the Engineer.

### **Materials**

Paints shall comply with the requirements of the appropriate Specifications below:

#### ***Primers***

SABS 678 : For wood

SABS 679 : Zinc chromate for steel  
SABS 723 : Etch-wash primer for metals  
SABS 912 : Calcium plumbate for galvanized iron  
SABS 926 : Zinc-rich epoxy for steel

***Undercoats***

SABS 681 : For all undercoats

***Finishing coats***

SABS 515 : For interior use, flat and egg-shell finish  
SABS 630 : For interior and exterior use, high-gloss enamel  
SABS 631 : For interior and exterior use, oil gloss paint  
SABS 633 : For interior use, emulsion paint  
SABS 634 : For exterior use, emulsion paint  
SABS 684 : For exterior use on structural steel  
SABS 801 : For interior and exterior use, epoxy-tar paint  
SABS 802 : For interior and exterior use, bituminous aluminium paint  
SABS 887 : For interior use, glossy and egg-shell varnish

The Contractor shall furnish the Engineer with the following information and details regarding the paints and decorative materials for the painting system he proposes to use, for written approval:

- a) The name of the manufacturer and trade name.
- b) The brand, type or grade of paint and the appropriate SABS Specification.
- c) Manufacturer's data sheets, colour references, instructions for use, including surface preparation, sealers, primers, undercoats, finishing coats, coat thicknesses and curing periods, which shall all be considered as being part of these Specifications if approved by the Engineer.
- d) Safeguards to protect the applied paint from damage until the work is accepted by the Engineer.
- e) The shelf or pot life of materials, if applicable.
- f) An undertaking that the proposed paint system is suitable for its intended use and that the various coats of paint are compatible with one another

Where proprietary brands are used, the manufacturer's priming and all subsequent coats of paint suitable for that particular brand shall be employed in accordance with the manufacturer's instructions.

No other materials of a similar nature and quality or from another manufacturer may be used instead of those approved, unless written permission to do so has been obtained from the Engineer. All materials shall be brought onto the Site in containers sealed by the manufacturer. Paints of a different quality, type, brand or colour shall not be mixed, or thinned and shall not be adulterated in any way, but shall be used as supplied by the manufacturer. Any mixing or tinting required shall be carried out

by the manufacturer. Tinting of paint on the Site by the Contractor will only be allowed with the written permission of the manufacturer and the Engineer.

### **Inspection and Preliminary Work**

Before commencing paintwork, the Contractor shall carefully inspect the surfaces to be painted to satisfy himself that the surfaces are in a satisfactory or acceptable condition to receive the paint system specified. All metal fittings and fastenings shall be removed where applicable before the preparatory processes are commenced. On completion, the metal fittings and fastenings shall be cleaned and refitted in position.

### **Workmanship and Finishes**

Paint may be applied by spray, brush or roller depending on the materials used, the surface to be painted, and the manufacturer's instructions. Every coat of paint, irrespective of the method of application, shall be adequately and permanently keyed or bonded to the base material or previously applied coat, and shall be evenly distributed, continuous, free from sags, runs, brush marks, pin holes or other imperfections, and shall dry to a smooth finish. An approved water trap and air-regulating valve shall be furnished and installed on all equipment used in spray painting.

Before painting the interiors of buildings they shall be cleaned and the floors shall be washed and kept free from dust during the progress of the interior work.

The Contractor shall protect all nearby surfaces against disfigurement by spatters, splashes and smirches of paint or paint materials. The Contractor shall be responsible for any damage by paint or dirt caused by his operations to vehicles or property or injury to persons and he will be required to provide protective measures to prevent any such damage or injury and make good, where required, at his own expense. If passing traffic creates dust which may harm or spoil the appearance of external painted surfaces, the Contractor shall sprinkle the adjacent areas with water, at his own cost, for a sufficient distance on each side of the location where painting is being done.

Undercoats shall be tinted by the manufacturer to distinguish between successive coats. The final coats or finishing coats of paint shall be applied after all the other work in the vicinity has been completed. The painter shall keep some of the final paint in reserve in the event of his having to make good any patching which may be required as a result of damage or unforeseen circumstances.

Upon completion, the Contractor shall, in the case of buildings, clean all glass, remove all paint spots from walls, floors and fittings, and leave the premises clean and fit for occupation. All inflammable materials, comprising solvents, thinners, wiping cloths, etc. shall be placed in tightly closed containers and properly disposed of.

### **Painting of Plaster, Concrete or Brick Surfaces**

#### ***Surface preparation***

Surfaces for painting shall be prepared by sandpapering, scraping or wire-brushing to remove loose material, dust, laitance, scum or other deleterious materials or high spots. Defective areas shall be cut

out where necessary and made good with an approved non-shrink filler. Cracks shall be cut out, suitably keyed, and given a coat of an approved bonding agent before the filler is applied. All patches shall be rubbed down to an even surface. Surfaces shall be washed and allowed to dry. Surfaces shall be treated with neutralising liquid for walls, and if the surface is coarse or textured, either one full coat of pigmented wall sealer or one full filler coat shall be applied in addition to the neutralising liquid.

### ***Paint application***

Prior to the emulsion paint being applied, the surface shall be sealed with an approved clear sealer and primed with an undercoat diluted to 50%. Emulsion paint (PVA or acrylic) shall then be applied in two finishing coats. Egg-shell finish (alkyd oil-based), oil gloss paint or enamel gloss paint shall be applied as follows: one coat of universal undercoat shall be applied and it shall be followed by one coat of a mixture comprising 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of semi-gloss eggshell, or oil gloss paint or enamel gloss paint shall then be applied.

### **Painting of Woodwork**

#### ***Surface preparation***

The surfaces shall be cleaned, sandpapered and rubbed down to a smooth, even face before painting. The moisture content of the timber shall not be more than 20% at the time when the first coat is applied. All cracks, shakes or scars shall be filled flush with a filler approved by the Engineer before painting. The surface shall then be washed with cleaner and allowed to dry.

#### ***Primer application***

One coat of an approved wood primer shall be applied. After open-grained timber has been prepared and primed, the grain shall be stopped and filled with synthetic filler and rubbed down with water paper. All new woodwork shall be properly primed on all surfaces and edges before being fixed in position. All woodwork not previously painted shall be given a prime coat, well brushed in.

#### ***Paint application***

One coat of universal undercoat shall be applied followed by one coat of a mixture of 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of oil gloss paint or enamel gloss paint or semi-gloss egg-shell (alkyd oil-based) paint shall then be applied.

#### ***Varnish finish***

Two coats of gloss varnish or egg-shell varnish shall be prepared, stopped and applied.

### **Painting of Metal Surfaces**

#### ***General***

Wherever possible, all painting shall be done at the manufacturer's works, but where this is not feasible, the Engineer may permit the application of the undercoat and finishing coats to be carried

out on the Site, in which case a prime coat shall be applied at the manufacturer's works prior to the members being despatched to the Works.

### ***Surface preparation***

The preparation of metal surfaces shall comply with SABS Code of Practice 064 and shall receive the greatest care to ensure rust-free conditions prior to the paint system being applied. All surfaces shall be prepared by removing loose paint, rust, plaster, scale, dust, dirt, grease etc. and by repairing or patching defective paint surfaces before painting or repainting. Damaged shop-primed surfaces shall be thoroughly cleaned of rust and patched with a prime coat.

### ***Paint application***

#### ***Iron and steel work***

All iron and steel work shall be properly primed with a red-lead-based primer where steel work is likely to be exposed to the elements for longer than 30 days. Zinc-chromate primer may be used where overpainting will be completed within 30 days of priming. Metal-etch wash primers may be used under dry conditions where overpainting will be completed within 24 hours of priming. The dry-film thickness of the prime coat shall not be less than 0,300 mm.

After priming, one coat of universal undercoat shall be applied. If necessary, the undercoat shall be tinted to a shade just lighter than the desired finish with approved liquid stainers. The dry-film thickness shall not be less than 0,250 mm.

The two finishing coats shall either be of alkyd resin-based synthetic enamel, gloss or matt oil paint, or as specified elsewhere. The dry-film thickness shall not be less than 0,250 mm per coat.

When mating surfaces are brought together, both surfaces shall have been given the full treatment specified, but where this cannot be done, each surface shall be given a copious coating of primer and the surfaces drawn together while the paint is still wet.

The portion of structural steel members to be buried in soil, and all bases to a height of 500 mm shall be given two coats of an epoxy-tar primer instead of the zinc-chromate primer specified for other surfaces.

The surfaces of steel and cast-iron articles, such as floor gratings, grids and manhole covers shall, after a thorough brushing to remove loose rust, be painted with two coats of epoxy-tar paint, each at least 0,230 mm thick.

#### ***Galvanized iron and steel***

All traces of protective coating shall be removed with galvanized iron cleaner, and two coats of calcium plumbate primer shall be applied. One coat of tinted universal undercoat and two finishing coats of alkyd resin-based synthetic enamel gloss paint shall be applied.

***Non-ferrous metals***

Surfaces of aluminium, copper etc. shall be prepared and cleaned, and one coat of self-etch zinc-chromate wash primer shall be applied. One coat of universal tinted undercoat and two finishing coats of enamel gloss paint shall then be applied. Where non-ferrous metals are not to be painted, the surfaces shall be cleaned, polished and two coats of lacquer applied.

**Painting of Floor Screeds**

Where chemicals could cause damage to floors, such floors shall be painted with an approved epoxy paint. The type of paint to be used will be shown on the Drawings and will depend on the types of chemical that are used. The preparation of such floor screeds for painting and the subsequent application of paints shall be carried out strictly in accordance with the manufacturer's instructions.

**Paint Thickness**

Unless otherwise specified, all coats of paint, whether prime coat, undercoat or finishing coat, shall have a dry-film thickness of not less than 0,200 mm, irrespective of the method of application.

**Inspection**

The Contractor shall provide the necessary equipment to establish whether the primers, undercoats and finishing coats have been applied to the correct thickness according to the correct applications. The Engineer may take samples of the paints during painting operations for testing and quality control.

**MEASUREMENT AND PAYMENT**

**Brickwork**

(Thickness, type and class indicated) ..... Unit: m<sup>2</sup>

The unit of measurement shall be the square metre of each type of brickwork built, calculated from the leading dimensions of the brickwork. Areas of pipes etc. built into brickwork shall not be included in the areas measured. At corners and intersections common to more than one brick wall, the areas shall be measured only once. The tendered rates shall include full compensation for the construction of the brickwork complete as specified, including pointing, the supply and building-in of conduits, beams, lintels, pipe sleeves, the raking-out of joints, weepholes, wall ties, brickforce reinforcement as specified, as well as the building in of plasterwork, facings, paintwork doors, windows, etc. where scheduled.

**Plasterwork**

(Thickness of plaster and finish indicated) ..... Unit: m<sup>2</sup>

The unit of measurement shall be the square metre of each type of coat completed as specified.

The tendered rates shall include full compensation for the construction of the plasterwork, including supplying all materials, mixing, applying, finishing, forming reveals, joints, narrow widths, rounded angles, V-joints etc. complete as specified.

**Floor Screeds**

(Description and thickness indicated) ..... Unit: m<sup>2</sup>

The unit of measurement shall be the square metre of floor screed laid, as specified, on floors, steps or areas shown on the Drawings or as designated by the Engineer. The tendered rates shall include full compensation for constructing the floor screeds, including supplying all materials, mixing, laying, finishing, and forming nosings, reedings, skirtings etc.

**Doors and Windows**

(Type and size indicated) ..... Unit: No.

The unit of measurement shall be the number of doors and windows installed complete as specified. The tendered rates shall include full compensation for manufacturing and installing steel or aluminium doors, windows, and frames complete with hinges, handles, locks, barrel bolts, door closers, retaining devices, door stops, stays and any other work or ironmongery necessary to complete the work as specified or as shown on the Drawings. The tendered rate for doors and windows shall also include full compensation for glazing, window sills and thresholds as specified, including all necessary timber subframes for aluminium doors and windows, etc

**Ceilings**

(1) Plaster-board ceiling (type and thickness indicated):

a) Fixed ceiling ..... Unit: m<sup>2</sup>

The unit of measurement shall be the square metre of fixed or suspended ceiling or bulkheads installed complete as scheduled. The unit of measurement for cornices shall be the linear metre. The tendered rates shall also include full compensation for the construction of the ceilings, bulkheads and cornices including the exposed tees, grids, frameworks, hangers, trap doors, insulation blanket and brandering as specified, as well as the suspension system where applicable.

**Joinery**

(1) Items measured by number:

a) Doors (type and size indicated)..... Unit: No.

b) Etc for other items measured by number

(2) Items measured by length:

a) Skirtings (type and size indicated) ..... Unit: m

b) Etc for other items measured by length



The units of measurement shall be the number or metre of each type and/or size of joinery item specified. The tendered rates shall include full compensation for supplying all materials, and manufacturing, cutting, wasting, fixing and installing the joinery items. Tendered rates for doors shall also include for all ironmongery applicable to the specific doors as specified and indicated on the door and ironmongery schedule drawings, including fixing, installing, testing etc.

**Miscellaneous Work**

- (1) Paintwork ..... Unit: m<sup>2</sup>, m, Sum
- (2) Plumbing ..... Unit: m, No., Sum

The unit of measurement shall be as scheduled. The tendered sums or rates shall include full compensation for the supply of all materials, delivery to site, storage, all equipment and labour, preparation, application, installation, testing, all temporary work and safety precautions, replacement of defective work, protection of completed work and clean-up after completion.

**Miscellaneous Items**

- (1) Items measured by area:
  - a) (Description of item) ..... Unit: m<sup>2</sup>
- (2) Items measured by length:
  - a) (Description of item) ..... Unit: m
  - b) Etc
- (3) Items measured by number:
  - a) (Description of item) ..... Unit: No.
  - b) Etc

The unit of measurement shall be the number, linear metre and square metre as applicable to each item. The tendered rates shall include full compensation for all labour, plant, equipment, transport etc., manufacturing or providing and installing each item complete as scheduled and shown on the Drawings, and shall include all corrosion protection where applicable.

## **M) MECHANICAL EQUIPMENT SPECIFICATIONS**

### **COAGULANT DOSING**

The coagulant selected for use in the treatment process is polyelectrolyte which is to be delivered to site by bulk tanker. The storage and dosing installation shall be installed in the flocculation room located underneath the splitter box at the head of the works and shall comply with the following requirements:

- All uPVC pipework shall be in accordance with SANS (SABS) 966-1:2013 with a class 16 pressure rating.
- 63mm Ø uPVC surface mounted transfer pipework complete with quick coupling and PVC isolating valve at the loading point and PVC isolating valves at all top entry points to the storage tank (Minimum of 2 No.).
- 63mm Ø uPVC scour valve at tank floor level.
- 63mm Ø uPVC vermin proofed vent pipe.
- 5 000 litre closed plastic storage tank with 600mm diameter lockable manhole access lid suitable for the storage of the reagent. All pipework connections to the tank shall be flanged. The tank shall be fitted with 20mm Ø clear level indicator complete with bottom isolating valve. The level indicator shall be supported in an epoxy-coated mild steel channel strapped to the side of the tank with stainless steel straps for protection.
- Minimum 20mm Ø uPVC surface mounted polymer transfer pipes from the two bulk storage tanks to 2 No. 200 litre dosing tanks and from the dosing tanks to the polymer transfer pumps and from the polymer transfer pumps to the dosing point.
- Duty and standby polymer transfer pumps to transfer polymer from storage tanks to dosing tanks.
- 2 No. 200 litre dosing tanks shall be provided with a potable water supply for dilution when required.
- Duty and standby digital reagent dosing pumps suitably rated (Alldos or similar approved) complete with flow dampeners to mitigate pulsating flow.
- Dosing shall be through a sparge pipe with potable carrier water to ensure even dosing at the inlet works

### **Operation and Automation**

- The dosage rate shall be manually (locally) adjustable about a set point and automatically flow proportional to the raw water inflow.

### **DOSING PUMPS**

The scope of works includes the supply and installation of the three dosing pumps within the chemical dosing room complete with motors and controls and all necessary pipework, fittings and pipe supports to connect to the suction and delivery pipes in accordance with the drawings.

The pumps shall be similar in all respects and shall be selected to deliver a range of 1 to 10 l/h.

The dosing pumps shall be positive displacement pumps and shall comply with the following requirements:

- Chemical dosing pumps shall be fabricated from materials suitable for the intended purpose.
- The pumps shall be of the digital diaphragm dosing type with a turn down ratio of at least 100.
- The pumps shall be fitted with flow dampeners to ensure a smooth almost continuous flow rate.
- The pumps shall be equipped with a stepping motor to ensure precise and stable dosing.
- The pumps shall incorporate a low level probe and shall have internal protection to prevent over pressurization of the delivery line.
- The pumps shall have a 4-20mA input.
- The pumps shall have an integrated digital display with a pin code lockable touch pad showing:
  - Set maximum pressure.
  - Dosage rate.
  - Integrated flow.
- The pump shall have 220V power supply

Parameter	Description/Value
Liquid to be pumped	Polyelectrolyte
Dosing rates	1-10 l/h
Power	220V

## POLYMER TRANSFER PUMPS

The scope of works includes the supply and installation of two polymer transfer pumps complete with motors and controls and all necessary pipework, fittings and pipe supports to connect to the suction and delivery pipes in accordance with the drawings.

The pumps shall be similar in all respects and shall be selected to deliver 1.0 l/s.

The polymer transfer pumps shall be positive displacement pumps and shall comply with the following requirements:

- Chemical dosing pumps shall be fabricated from materials suitable for the intended purpose.
- The pumps shall incorporate a low-level probe and shall have internal protection to prevent over pressurization of the delivery line.

Parameter	Description/Value
Liquid to be pumped	Polyelectrolyte
Temperature	14 to 25 <sup>0</sup> C
Flow rates	1 l/s
System Head	10 m
Power	380V, 3 phase, 50Hz

## BACKWASH PUMPS

One duty and one standby pump are required to backwash the filters.

The tendered rate shall include the supply and installation of the two backwash pumps within the Pump Room complete with motors and controls. All necessary pipework, fittings and pipe supports to connect to the suction and delivery pipes are to be in accordance with the drawings and are itemised separately in the bill of quantities. The backwash pumps shall be controllable from the filter gallery.

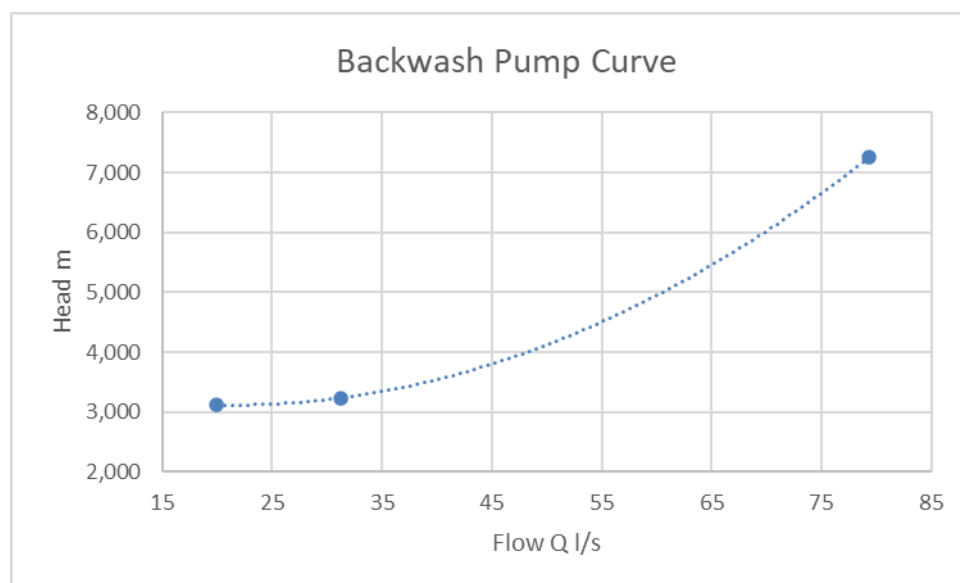
The pumps shall be similar in all respects and shall be fitted with variable speed drives and selected to deliver a minimum of 50 l/s against a total system head of 5.3 m and a maximum of 103 l/s against a total system head of 8.2 m.

Bearings shall be selected with a B10 life in excess of 100 000 hours. Bearings shall be provided with easily accessible grease nipples for lubrication.

Motors shall be rated with a service factor of 1.2 on maximum power.

Submersible pumps will not be accepted.

Parameter	Description/Value
Liquid to be pumped	Treated Potable Water
Temperature	14 to 25°C
Flow rates	40 - 80 l/s
System Head	5.1 – 7.25 m
Power	380V, 3 phase, 50Hz



**DOMESTIC WATER PUMPS**

One duty and one standby pump are required to supply domestic water to the works.

The tendered rate shall include the supply and installation of the two pumps within the Pump Room complete with motors, controls and all necessary pipework, fittings and pipe supports to connect to the suction and delivery pipes.

The pumps shall be similar in all respects and shall be selected to deliver a minimum of 5 l/s against a total system head of 12 m.

Bearings shall be selected with a B10 life in excess of 100 000 hours. Bearings shall be provided with easily accessible grease nipples for lubrication.

Motors shall be rated with a service factor of 1.2 on maximum power.

Submersible pumps will not be accepted.

<b>Parameter</b>	<b>Description/Value</b>
Liquid to be pumped	Treated Potable Water
Temperature	14 to 25°C
Flow rates	5 l/s
System Head	12 m
Power	380V, 3 phase, 50Hz

**AIR BLOWERS**

One duty and one standby blower are required for the air scouring of the filters.

The tendered rate shall include the supply and installation of the two Rotary twin Lobe Blowers within the Pump Room complete with motors and controls. All necessary pipework, fittings and pipe supports to deliver air to the filter beds are to be in accordance with the drawings and are itemised separately in the bill of quantities. The air blowers shall be controllable from the filter gallery.

The blowers shall be similar in all respects and shall be mounted on a single galvanised baseplate and shall be V-belt driven. The maximum rotational speed of the blower shall be 1500 rpm. The intake end of the blower shall be fitted with an air filter and silencer. The air filter shall have a maintenance indicator.

The delivery pipework shall be fitted with:

- A silencer.
- Wafer type non-return valve.

- Pressure relief valve.
- Bourdon type glycerine dampened pressure gauge (100mm diameter with a range of 0 to 100 kPa).
- 100 DN flexible coupling to ensure that vibration transmission along the delivery pipeline is minimised.

Parameter	Description/Value
Liquid to be pumped	Air
Temperature	14 to 25°C
Volume of air	10m <sup>3</sup> /min
System Head	30 kPa
Power	380V, 3 phase, 50Hz

## CHLORINE DOSING

The chlorine installation shall be based upon gaseous abstraction from 1 tonne cylinders. Chlorine will be stored in the Chlorine Storage Room and the dosing equipment shall be located in the Vacuum Room. The motive water pumps and MCC shall be located in the Pump Room.

### Chlorine Storage and Vacuum Room Equipment

The scope of works includes the supply and installation of the following equipment in the Chlorine Storage Room:

- Lifting beam, 2T electrical hoist with lift and crawl capability and spreader beam (priced separately – see Section 3 of the bill of quantities).
- Pipe manifold to accommodate 2 No. x 1000kg cylinders. The manifolds shall incorporate heated drip tubes to prevent condensation.
- The pipe manifolds shall terminate with an end plug to enable periodic purging of the line using nitrogen. (The provision of a nitrogen cylinder is not included in this contract).
- Each “pigtail” shall have an isolating valve on each end to prevent chlorine loss during cylinder change.
- The manifolds shall be plumbed into an auto-change-over unit which shall shut down on leak detection.
- Load cells with LOCAL LED digital mass (kg) indicators shall be provided for both 1 tonne cylinders.
- The room shall be equipped with a suitably rated fan with elevated (2m above roof) vermin and weather proofed duct. The fan switch shall be located in the Pump Room.

The scope of works also includes the supply and installation of the following equipment in the Vacuum Room:

- 3 No. (2 duty, 1 standby) chlorine flow regulators, each sized for 2 kg/h. The flow regulators shall be equipped with 4-20mA inputs to enable flow proportional dosing control. Connecting valves and pipework shall allow for the following operating permutations:

- Pre-filter chlorination - Duty chlorinator
- Post-filtration chlorination - Duty chlorinator
- Pre or post chlorination - Standby chlorinator
- Duty, standby motive water pump system (380 V) with duty to suit.
- Motive water pipework shall be 50DN minimum.

### **Chlorine Safety Equipment**

The following minimum equipment shall be provided at the chlorine storage and dosing installation:

- Chlorine detectors (2 No.) with one located in the Chlorine Storage Room and the other located in the Vacuum Room. The chlorine detector shall trigger an audible alarm and visual alarm located at the chlorine room.
- A foot activated safety shower complete with a water supply from the potable water supply.
- Eye bath.
- Two sets of breathing apparatus for emergency use.
- Ammonia torch.

### **Operation and Automation**

- The dosage rate shall be manually (locally) adjustable and automatically flow proportional about a set point.
- Alarms shall be visual and audio and relayed to the control room and or SCADA system.

## **FILTRATION**

### **Filter Floor**

The filter shall have a plenum (false floor) under drain system that shall be of the monolithic type to enable simultaneous backwash and air scour. The drainage system shall be comprised of vertical slot filter nozzles at a density of 42 nozzles per m<sup>2</sup> (spacing of 155 mm x 155 mm). The slot size shall be 0.25 mm x 22 mm with 30 slots per nozzle. The nozzles shall have an air metering orifice to ensure even air distribution during the air scrub cycle and shall also incorporate an air bleeding orifice to bleed air from the plenum cavity following the air scrub cycle. The stem of the nozzle shall protrude a minimum of 100mm below the soffit of the filter floor.

The nozzles shall be installed in sleeves to facilitate easy removal and replacement when required.

### **Filter Testing**

Upon completion, each filter will be tested by subjecting each chamber to a test pressure of 80kPa whilst the floor is covered with 100 mm of water. No perimeter joint leakage nor leakage at filter ferrules will be permitted.

Once the pressure test has been completed, each filter shall be subjected to a "bubble test" with 150mm of water covering the nozzles. The air distribution shall be equal and no "boiling" or "dead spots" shall be evident in the air pattern during the "bubble test".

### **Filter Media**

Single size silica sand media shall be utilised in the filters and the media depth shall be 1000mm. The filter media shall comply with the following specifications:

- The effective particle size (ES) shall be  $0.9\text{mm} < \text{ES} < 1.2\text{mm}$ .
- The uniformity coefficient (uc) of the media shall be less than 1.4 where  $uc = d_{60}/d_{10}$ .
- Particle specific gravity (SG) shall be  $2.4 < \text{SG} < 2.7$ .
- Silica content shall be  $> 96\%$ .

### **TEMPORARY RELOCATION OF CHEMICAL DOSING FACILITIES DURING CONSTRUCTION PHASE**

The chemical dosing room currently serving the Centocow water treatment works will have to be demolished in order to provide sufficient space for the construction of the new treatment works building to be constructed under this Contract. The existing Centocow water treatment works however must remain functional during the construction phase until such time as the upgraded works has been commissioned. The Contractor will therefore be required to relocate the existing chemical dosing facilities (coagulant dosing and chlorine dosing pump pipework and chemical storage) to a temporary storage facility e.g. a 6m shipping container, for the duration of the construction period.

The tendered rate shall include for the following:

- Supply, transport, positioning and installation of a 6m shipping container at the Centocow WTW for the duration of the construction period (18 months), including any earthworks / ground preparation required for the container. It is noted that no additional payment for any hiring costs associated with the container shall be entertained if the Contractor fails to complete the project within the construction period unless the Contractor has been granted a valid extension of time for completion by the Client.
- Dismantling the existing coagulant and chlorine dosing pumps and pipework and reinstalling and commissioning these within the container.
- Any additional pipework, fittings, tubing etc. that may be required to ensure that the relocated chemical dosing facilities are able to function.
- Provision of a temporary power supply to the dosing pumps. Any initial costs for the provision of power within the container as well as monthly operational costs associated with the running of the dosing pumps shall be included.
- Provision of the necessary small power and lighting requirements within the container.



## N) LABOUR INTENSIVE CONSTRUCTION

### CONSTRUCTION ACTIVITIES

#### Excavation

Material, including topsoil may be excavated by hand only if practicable. Harder material may be loosened by mechanical means prior to excavation by hand, where practicable.

The excavation of any material which could represent danger or injury to workers shall not be excavated by hand.

#### *Trench Excavation*

Materials classified as suitable for hand excavation may be excavated by hand in trenches having a depth of less than 1.5 metres.

Typical task rates for labour intensive constructive methods (for tendering purposes) are provided below.

Activity	Production Rate / Person / Day
1. <b>Trench Excavation 0 to 1m deep</b>	
(i) In Very Loose/Very Soft material	3.5m <sup>3</sup>
(ii) In Loose/Soft material	2.8m <sup>3</sup>
(iii) In Medium Dense/Firm material	1.7m <sup>3</sup>
2. <b>Trench Excavation 1 to 1.5 m deep</b>	
(i) In Very Loose/Very Soft material	3.0m <sup>3</sup>
(ii) In Loose/Soft material	2.4m <sup>3</sup>
(iii) In Medium Dense/Firm material	1.5m <sup>3</sup>
3. Grubbing 1 metre wide strip	10.0m
4. Earthworks (incl. load up to 1m lifting)	
(i) In Very Loose/Very Soft material	4.5m <sup>3</sup>
(ii) In Loose/Soft material	4.0m <sup>3</sup>
(iii) In Medium Dense/Firm material	3.5m <sup>3</sup>
(iv) In Dense/Stiff material	3.0m <sup>3</sup>
5. Wheel barrow haul	
(i) 0 - 20 m	11,5m <sup>3</sup>
(ii) 20 - 40 m	8,5m <sup>3</sup>
(iii) 40 - 60 m	6,5m <sup>3</sup>
(iv) 60 - 80 m	5m <sup>3</sup>
(v) 80 - 100 m	4,5m <sup>3</sup>
6. Backfilling using sand 0 - 1,5 m deep	3,5m <sup>3</sup>
7. Placing pipe bedding	2.5m <sup>3</sup>
8. Concrete	
(i) Mixing	1,5m <sup>3</sup>
(ii) Placing	1m <sup>3</sup>

9.	Laying blockwork/brickwork	
(i)	Per packer	50m <sup>2</sup>
(ii)	Per team member	3,5m <sup>2</sup>

***Backfilling to trenches in non-trafficable areas***

Backfilling to trenches shall be placed in layers of thickness not exceeding 100 mm. Each layer may be compacted by hand stampers where practicable:

- a) To 90% Proctor density;
- b) Such that more than 5 blows of a Dynamic Cone Penetrometer (DCP) is required to penetrate 100 mm of the backfill, provided that the backfill does not comprise more than 10 percent gravel of size less than 10 mm and contains no isolated boulders, or
- c) Such that the density of the compacted trench backfill is not less than that of the surrounding undisturbed soil when tested comparatively with a DCP.

***Other Excavation***

In all other excavations up to a depth of 1.5 meters, materials suitable for excavation by hand, including topsoil so classified, may be excavated by hand where practicable. Harder material may be loosened by mechanical means for removal by hand.

**Clearing and Grubbing**

Grass, shrubs and small bushes may be cleared by hand where practicable.

**Shaping**

All shaping may be done by hand where practicable.

**Loading**

All loading of material excavated by hand, regardless of the method of haulage, may be undertaken by hand where practicable.

**Haulage**

Material excavated by hand may be hauled to its point of placement by means of wheelbarrows where practicable, where the haulage distance is not greater than 100 metres and the slope against which the haulage is done is less than 20 percent.

**Offloading**

Material not hauled by tipper trucks, dumpers or wheelbarrow, may be off-loaded by hand where practicable.

**Spreading**

Materials, except rock fill, may be spread by hand where practicable.

**Grassing**

Grassing may be undertaken by hand where practicable.

### **Stone pitching and rubble concrete masonry**

Stone required for stone pitching and rubble concrete masonry, whether grouted or dry, may be collected, loaded and offloaded by hand where practicable, unless acquired from a commercial source. Stone placing may be by hand. Grout for stone pitching may be mixed by hand where practicable.

### **Manufactured Elements**

Individual elements designed and manufactured by the contractor, such as manhole rings, cover slabs, concrete planks and pipes, edge beams and the like, may not have a mass of more than 320kg. The elements should also be large enough so that four workers can comfortably and simultaneously acquire a proper handhold on them.

## **EMPLOYMENT OF LOCAL LABOUR**

### **Labour Resourcing**

Unskilled and semi-skilled labour shall be resourced through the project's labour desk.

### **Contract of Employment**

A pro-forma Contract of Employment must be completed for each member of the labour force engaged. A copy of the Contract of Employment completed for each and every member of the labour force engaged shall be given to the Engineer prior to their commencing work on this Contract.

### **Construction Activity Tasks**

#### ***Production Rates for Tender Purposes***

It will be assumed that the tendered rates, where applicable, have been based on the typical production rates given in the table under clause PF 1.1.1.

Notwithstanding the production rates shown in the table, tasks established by the Contractor shall be such that:

- i. the average worker completes 5 tasks per week in 40 hours or less and,
- ii. the weakest worker completes 5 tasks per week in not more than 55 hours.

When it is established that the production rates set by the Contractor do not comply with (i) and (ii) above, the Contractor shall, on instruction from the Engineer, revise the production rates to comply with the requirements of (i) and (ii).

## O) ELECTRICAL WORKS

### LV ELECTRICAL SCOPE OF WORKS

#### Free Issue Material / Services

The Client nor the Main Contractor shall issue any free-issue materials nor render any labour, transport or machinery and tools assistance. The Electrical Contractor shall supply all materials, labour, transport, machinery and tools required for the complete LV works.

#### Exclusions

Any mains supply reinforcements beyond the metering point, supply authority metering or MV supply.

#### Low Voltage (400/231V) Electrical Works, Reticulation and Distribution:

This scope of works shall include the design (for the MCCs and DBs), procurement, supply, loading, delivery, off-loading, storage, installation and commissioning of new Motor Control Centre, PLC & Telemetry system, Earthing, Cable Reticulation, Building Distribution, Area Lighting and associated electrical works for the Water Treatment Works, which shall include but not limited to the following scope of works and services:

- Cooperation and liaison with any or all Engineers, Client, Main Contractor, Sub-Contractors and Suppliers, which shall include planning and project programming,
- Supply of all materials and equipment,
- Delivery and all associated transport including crane hire and rigging where required,
- Loading and off-loading,
- Storage and security,
- Site clearing where required,
- Supply of all labour including professional, skilled and semi-skilled,
- Supply of all plant, vehicles, tools and machinery,
- Trenching, boring and barricading,
- Backfilling, compaction & landscaping,
- Site clearing,
- Testing & commissioning,
- The provision of acceptable "as-built" documentation including red-lined drawings.

## LV ELECTRICAL WORKS GENERAL

### Abbreviations

A	Ampere(s)
AC	Alternating Current
al	Aluminium
BoQ	Bill of Quantities
cu	Copper
DB	Distribution Board
ECC	Earth Continuity Conductor
E/F	Earth Fault
FAT	Factory Acceptance Testing
IP	Ingress Protection
kV	kilo Volt (voltage)
kVA	kilo Volt-Ampere (unit of apparent power)
kVAr	Kilo Vars (unit of reactive power)
kW	kilo Watt (unit of real power)
kWh	kilo Watt Hours (unit of energy consumption)
LED	Light Emitting Diode
LV	Low Voltage (< 1000 V)
m	Metre (unit of length)
MCB	Miniature Circuit Breaker
MCC	Motor Control Centre
MCCB	Moulded Case Circuit Breaker
MD	Maximum Demand
MV	Medium Voltage (1000 – 36 000 V)
O/C	Over Current
OHS&E	Occupational Health, Safety & Environment
PLC	Programmable Logic Controller
PS	Pump Station
PVC	Polyvinyl Chloride
SCADA	Supervisory Control & Data Acquisition
SLD	Single Line Diagram
SWA	Steel Wire Armoured
TBD	To be Determined
TBP	To be Provided
TRF	Transformer
V	Volt(s)
W	Watt
WTW	Water Treatment Works

## Drawings

Drawing No.	Title	Sheet Size	Revision
316WS-E.01	MCCs and Distribution Boards: SLDs	A0	A
316WS-E.02	Cable Reticulation & Area Lighting	A1	A
316WS-E.03	WTW Building Small Power & Lighting	A1	A

The Electrical Contractor shall ensure that the most recent revision for all drawings is used at all times.

Revision 0 – 10 shall be used for construction purposes.

Revisions A – E shall be used for tendering or quoting purposes only.

Drawings shall be plotted to the correct size and in colour to ensure that the correct details are used.

## Site & System Conditions

### *Site access and delivery details*

Facility	Requirements/Comments
Site location	Centocow, Kwa-Zulu Natal
Access to site	Mainly asphalt and gravel roads
Site Office	Site office facilities are not required
Offloading	The contractor is responsible for all offloading
Crane facilities	The contractor is responsible for the hire and operation of any crane facilities required. The contractor will personally supervise all crane operations and activity
Storage Facilities	None. The responsibility for storing of materials will be that of the Contractor. The client will accept no materials until they are installed in their final positions and commissioned
Electricity	Mains supply is available. The contractor shall provide a portable generator where supply is not readily available.
Water supply	Available for drinking purposes only
Toilet Facilities	None. The Contractor shall provide such facilities where required
Security	<b>Limited.</b> The onus rests with the Contractor to secure all materials, tools and equipment. The Client shall not be held responsible for any loss or damage resulting from theft, damage or vandalism. <b>The Contractor shall make provision for his own security.</b>

### *Site Conditions*

No.	Description	Condition/Comments
1	Altitude	The altitude in the area varies between 1100 m and 1150 m above mean sea level.
2	Temperature	Ambient temperature between 10°C and 30°C

		Average daily maximum ambient: 17°C
3	Humidity	Summer: Mid 50%
		Winter: Low
4	Rainfall	Approximately 850 mm per annum. An average of 2 – 3 working days per month are lost due to inclement weather. No claims for delays as a result of adverse weather conditions shall be considered.
5	Lightning	The area is subject to severe lightning storms, approximately 6.3 flashes/km <sup>2</sup> /year

**Electricity Supply System**

The nominal system voltages are 11kV, 400V three phase and 231V single phase. The system frequency is 50 Hertz and the phase rotation is R-W-B anti-clockwise. The maximum MV system voltage is 12.5kV.

**General Requirements**

**General**

All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and adequate working space for such activities.

The design of the installation shall comply with **SANS 10142-1**.

The plant shall incorporate all components and equipment necessary to achieve the functionality defined in the specification.

All materials, components, and equipment used in the manufacture of the plant shall be new and unused, shall be of current manufacture, and shall be free from any defects or imperfections.

The arrangement of all circuit components/functional units shall be to the approval of the Engineer.

**Safe Design**

All equipment supplied under this contract shall be designed:

To prevent any injury to personnel employed on the construction, operation and maintenance of the plant.

To facilitate inspection, cleaning and repair of the equipment.

To operate continuously and satisfactorily in the prevailing site conditions.

To be able to withstand without damage such sudden variations of electrical load as may be met under normal working conditions, including short circuits and lightning strikes.

To obviate risks of accidental short-circuits due to animals, birds and insects.

To avoid pockets in which water can collect in outdoor equipment.

To avoid condensation in closed compartments by the provision of adequate ventilation or where necessary, heaters.

Such that conductors can carry normal load and fault currents without overheating or other damage.

Such that moving parts can be readily lubricated. Grease nipples shall be provided in accessible positions for this purpose.

To be vermin proof.

To be corrosion resistant.

### ***Quality of Materials and Workmanship***

All materials and equipment for this Contract shall be new and undamaged. Corresponding parts shall be interchangeable.

Where so directed by the specification or by the Engineer, the Contractor shall provide samples and test certificates of materials for approval.

The labour used by the Contractor shall at all times be adequately qualified and experienced for the particular task.

### ***Tools and Test Devices***

The Contractor shall provide a complete set of any special purpose tools, equipment or test devices necessary for the safe operation and maintenance of the equipment supplied on this Contract.

A list of this equipment shall be provided together at the time the Bid/Offer is submitted.

### ***Fixings and Connections***

Nuts, Bolts and Washers:

Only metric size nuts, bolts and washers shall be used unless otherwise specified. Each bolt or stud shall project at least one thread but not more than 6 mm from the nut. Special spanners shall be provided where nuts and bolts are not easily accessible. The nuts on the moving plant or plant subject to vibration shall be fixed by means of locknuts, "Loctite" or other approved locking method. Bolts and studs shall be adequately sized to carry the loads, which may be imposed on them.

### ***Galvanising and Painting***

The area has a fairly corrosive atmosphere and special attention shall be given to all finishes.

**NO** drilling, cutting, bending, punching, welding and forming of the steel or any surface damage shall be allowed after galvanising or painting.

Should it be necessary to drill or cut any galvanised structure, the member/object in question shall be returned for sand blasting and re-galvanising. Cold galvanising shall not be accepted.

All steel to be hot dip galvanised in accordance to SANS 121 with a minimum zinc deposit of 85 microns.

All paint colours shall be approved by the Engineer.

## **Occupational Health & Safety**



The attention of the Electrical Contractor is drawn to the requirements of this Act and in particular, the Construction Regulations.

The Electrical Contractor shall also ensure that any sub-contractor employed by him shall also comply with the Act and the regulations.

**Regulations and Standards**

The design, construction, installation, inspection, testing and commissioning of the plant shall comply with all relevant statutory regulations, and the latest editions (current at the time of Tender) of all relevant South African National Standards.

The manufacturer shall operate an approved, auditable quality assurance system covering the design, construction, inspection and testing of the plant.

The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:

1. Occupational Health and Safety Act (Act 85 of 1993),
2. Construction Regulations 2003 issued in terms of Section 43 of the Act,
3. Local Fire Regulations, and
4. Regulations of the Local Supply Authority.

**Regulations, Specifications and Standards:**

Standard Number	Description
SANS 152	Low-voltage air-break switches, air-break disconnectors, air-break switch disconnectors, and fuse-combination units
SANS 156	Moulded case circuit-breakers
SANS 1973	Low-voltage switchgear and control gear Assemblies
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 60044	Instrument Transformers
SANS 60439	Low-voltage switchgear and control gear assemblies
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60947	Low-voltage switchgear and control gear
SANS 61643	Low-voltage surge protective devices Part 1: Surge protective devices connected to low-voltage power distribution systems
SANS 1213	Mechanical cable glands
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 10199	The design and installation of earth electrodes
IEC 50086	Conduit systems for cable management
SANS 10292	Earthing of low-voltage distribution systems
SANS 62305-3	Protection against lightning: Physical damage to structures and life hazard

Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:

South African Sectoral Standards and Specifications (SANS, NRS, etc.)

ISO Standards

IEC Standards

British Standards (BS EN)

European National (EN) Standards

Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.

## GENERAL LV ELECTRICAL WORKS TECHNICAL SPECIFICATIONS

### **IMPORTANT NOTE:**

A Project Specific Specification (PG 4 below) takes precedence over a General Specification (this section). Should there be a conflict between a Project Specific Specification and a General Specification, the Project Specific Specification shall be used unless otherwise stated or instructed by the Engineer. For all specifications not covered under the Project Specific Specification (PG 4 below) the General Specification (this section) and applicable Regulations and Standards (PG 2 above) shall prevail.

### **SWITCHBOARDS & MCCs: GENERAL SPECIFICATION**

#### ***General Requirements for Motor Starters***

Each motor starter section shall be provided with an isolation and short circuit protection device.

Every individual motor starter unit shall include all equipment, components and wiring necessary to safely and reliably operate the driven plant item. It shall be possible to manually operate plant from the front panel of its functional unit, notwithstanding any failure or deselection of any automatic control system, networking/communication facility, PLC, SCADA, or telemetry system. In order to achieve this, the appropriate push buttons/keypads and indicators shall be provided on the front of the panel.

If the power supply fails whilst a motor is running, the line contactor shall open. On restoration of the power supply, the motor starter shall immediately be made available to restart the motor without manual attendance or intervention on receipt of a start command (be it initiated manually or automatically). However, where a hardwired automatic control facility is available, a power-on delay timer (adjustable between zero and 60 seconds) shall be provided in the hardwired circuit.

Where a 'healthy' signal is required, it shall confirm that the functional unit isolation device is closed, the starter control supply is healthy, no fault condition exists, emergency stop(s) are released, the local isolator (where fitted) is closed. The 'healthy' signal shall be used to provide the 'drive available' input signal to any automatic control schemes or automatic duty selection routines.

Each functional unit shall provide any automatic control schemes (including auto duty selection routines) with the following status signals as a minimum, as well as all others as specified in the Project Specific Specification:

5. Manual/auto mode
6. Running
7. Tripped
8. E/Stop activated

Each motor starter shall be provided with an emergency stop circuit, which together with its components shall comply with BS EN 418. A field 'twist to reset' emergency stop button shall be provided. On operation of the emergency stop circuit, the motor line contactor shall immediately open, and the emergency stop circuit shall lock out until it is reset. A front of panel 'emergency stop operated' indication lamp and a status signal for PLC monitoring shall be provided. A composite starter may have a common emergency stop circuit controlling all of its constituent drives.

Where and if identified in the Project Specific Specification, specific process or driven plant interlocks shall be hardwired into the motor starter, and when operated, shall stop and inhibit the drive. Front of panel pushbuttons shall be provided for manual start (forward, and where applicable; reverse), and manual stop. A front of panel control selector switches shall be provided for 'Manual/Off/Auto' or 'Remote/Local' as specified. Front of panel indicator lamps shall be provided for 'running' and 'tripped', and a digital ammeter shall be provided for motor circuits; other front of panel indications e.g. specific fault indication lamps, hours run meter, number of starts counter, etc.

**Enclosures**

All conductors and terminals that form part of a Switchboard or MCC, including earth conductors and the earth bar, shall be enclosed within it. An earth stud may be provided as a part of a cable glanding facility. Switchboard and MCC assemblies shall be constructed of materials capable of withstanding the mechanical, electrical and thermal stresses to which it may be subjected and the environmental and operating conditions likely to be encountered in normal service. All boards, panels and cubicles shall be vermin and dust proof and the minimum degree of protection shall be:

Location	Description	Minimum rating
Indoor	Clean, dry areas (e.g. inside substations or motor control rooms)	IP44 (doors closed) IP2X (inter-compartment & doors open)
Outdoor	Located outside buildings	IP65 (doors closed) IP2X (inter-compartment & doors open)

Where heat is generated within the enclosure, it shall, where possible, be designed to dissipate naturally from the enclosure surface. Where this is not possible, ventilation openings shall be provided that maintain the highest practicable IP rating of the enclosure, subject to a minimum of IP42. Where cooling air is drawn into the enclosure, dust filters shall be provided where practicable. For all variable speed drives and soft-starters (without bypass contactors) installed in indoor MCC assemblies, mini-extraction fans shall be installed inside the drive compartment to dissipate heat, without compromising the assembly's IP rating. Particular attention shall be given to the ventilation of outdoor mounted boards, to eliminate build-up of excessive heat inside the boards caused by the solar radiation or internal heat generation. Purpose-made gland plates shall be protected against corrosion by electro-plating, galvanising, or be made of stainless steel and shall not be painted.

**Construction of Free-Standing MCCs, Switchboards and DBs**

Free-standing Switchboards and MCCs shall be constructed from steel with a structural frame permanently clad with side plates, so as to provide a multi-compartmented structure that is rigid with all doors and covers removed, and such that it will not deform during transport or

installation. The enclosure doors and covers shall themselves be suitably braced so as to be rigid and not deform or flex when fully equipped and handled.

Each compartment formed within the enclosure for the purpose of housing components or equipment shall be provided with dedicated mounting plates for that purpose, which when removed do not expose any other compartment or live parts. Cabling shall only be terminated on or in the enclosure at gland plates provided for that purpose.

The minimum metal thickness of the enclosure's constituent parts shall be as follows:

9. External cladding: 2mm
10. Internal partitions: 1.6mm
11. doors and removable panel covers: 2mm

Free-standing Switchboards and MCCs shall be mounted on and bolted to a rigid hot-dip galvanised steel 100 x 50 x 6 mm channel base.

The maximum height of any Switchboard or MCC (including its base) shall be 2100 mm above finished floor level. No equipment other than busbars and/or inter panel control wiring shall be installed higher than 1900 mm above finished floor height, neither shall any equipment, other than cable glands and inter panel control wiring be installed lower than 300 mm above finished floor level.

Compartment single doors shall have vertical hinges mounted on their left-hand side, and all doors shall have an angle of opening that is limited to 95 degrees.

Any cover which is required to be removed for adjustment, access, or maintenance and exceeds 0.75 m<sup>2</sup> in area, shall be provided with supporting lips, lift-off hinges, locating dowels, or handles, in order to facilitate safe removal and replacement.

The Switchboard or MCC shall be constructed for front and rear access.

Any apertures between compartments (including busbar compartments) through which the copper-work or cabling passes, shall be effectively closed off to minimise the possibility of an arc fault propagating between compartments.

Unless detailed otherwise specified in the Project Specific Specification, the Switchboard or MCC shall be constructed so as to facilitate future extension by the addition of extra full height sections at either end. To accommodate this, any covers, fixings, etc. shall be flush with the end faces of the enclosure, and the end sections of busbars and earth bars shall be prepared for future extension.

### ***Power distribution within a Switchboard or MCC***

The power distribution and circuit protective arrangements within a Switchboard or MCC shall be designed so as to co-ordinate with the characteristics of the electrical system(s) connected to the incoming terminals of the Switchboard or MCC, including emergency or temporary supplies and specifically noting the following:

12. maximum prospective RMS short circuit current from all simultaneously available sources of supply, together with any fault contribution from large motors directly connected to the Switchboard or MCC,
13. the maximum available earth fault current, and the maximum earth fault loop impedance, and
14. up-stream protective device ratings and settings.

### ***Functional unit short-circuit protection and isolation***

The Switchboard or MCC shall be provided with separate incoming isolation for every electrical power system (including emergency or temporary supplies) connected to it.

Every motor starter compartment shall be provided with a door interlocked isolation device, which shall isolate all sources of supply that enter the motor starter compartment. Where a functional unit; e.g. a motor starter, etc., comprises a group of interlocked compartments, the isolation device shall be located in the compartment receiving the supply.

Separate isolating devices shall be switch-disconnectors suitable for on-load switching. They shall be capable of being padlocked in the isolated 'off' position at the compartment door, and at the isolating mechanism with the compartment door open. Any isolator mechanism extension shafts shall be provided with guide brackets as necessary to prevent excessive shaft deflection.

The compartment door shall be mechanically interlocked such that it shall not be possible to open the door when the isolating device is in the 'on'/'closed' position or when the operating handle is padlocked in the 'off'/'open' position. Where the means of isolation is only accessible from within the compartment, it shall be protected to a level of IP2X.

### ***LV Switchgear (Circuit Breakers and Isolators)***

Circuit breakers shall be either air circuit breakers (ACBs) or moulded case circuit breakers (MCCBs), as indicated on the single-line diagram for the Switchboard or MCC.

CBs shall have a rated service short-circuit breaking capacity not less than that of the maximum prospective fault current at the point of connection in the power system, which shall be taken to be the busbar rated short-time withstand current specified for the Switchboard or MCC. Incomer CBs shall have a rated short-time withstand current and time not less than that of the busbars.

CBs with rated currents over 100A shall have built-in protection, that will discriminate with both up-stream and down-stream protective devices, as appropriate to the application.

ACBs for incomer and feeder applications shall be fitted with adjustable electronic protection. MCCBs shall be fitted with adjustable thermal-magnetic or adjustable electronic protection unless otherwise specified.

Special maintenance tools, where required, shall be provided with each breaker.

Cables connected directly to CB terminals will generally not be permitted. Adequately sized cable/busbar adapters shall be provided.

Isolators or switch-disconnectors shall be suitable for the continuous rated duty of the circuit it controls.

The utilisation category of the switch-disconnector shall be AC23 for motor switching duties, and AC22 for switching of mixed resistive and inductive loads, with an appropriate utilization category (A for frequent switching and B for infrequent switching).

Rotary switch-disconnectors shall be provided with a 'break-before-make' operation for each pole. The rotary switch, or changeover switch formed by the proprietary interlocked interconnection of two switch-disconnectors or fuse switches, shall incorporate a centre 'off' position.

Switch-disconnectors for motor starter or variable speed drive duties, that incorporate a test position, shall enable the control circuit supplies while ensuring isolation of the main supply.

### ***Contactors, Relays and Timers***

Contactors and relays shall be selected so as to be suitable for the foreseeable operating duty (utilisation category) and operational frequency. They shall operate reliably under reduced voltage conditions by closing (i.e. pulling in and holding) at 85%, and remaining closed at 60%, of the rated coil voltage, and shall be suitable for continuous operation at 110% of the rated coil voltage.

Contactors shall comply with SANS 60947-4-1, and shall be electro-magnetically operated air-break multi-pole block type construction. They shall readily accept a wide variety and configuration of auxiliary contact blocks, which shall have their terminals protected to IP2X.

Relays and timers shall be totally enclosed plug-in devices. The bases shall be keyed in order to differentiate between differing relays and timers, and their differing coil/electronics operating voltages, and to prevent incorrect insertion. Bases shall be fitted with retaining clips, and each relay/timer shall have its pin configuration printed on the side of its casing.

Relay/timer bases shall have screw clamp type terminals protected to IP2X, which shall be accessible with a screwdriver whilst the relay/timer is plugged in.

Relays shall be provided with a transparent enclosure, visual indication that the relay is in the energised and closed state, and a manual test button.

Timers shall operate electronically or be synchronously driven, and shall be provided with linearly calibrated time interval scales. The smallest indicated time interval shall be 10% (or less) of full scale, with a repeatability of 1% (or better) of full scale. Timers shall be provided with 'energised' and 'timed out' indicators.

Where timers require to be viewed by operators, they shall be flush front of panel mounted behind a transparent lockable cover.

Contactors shall satisfactorily withstand the thermal and dynamic effects arising from the magnitude and duration of through fault currents dictated by the characteristics of the associated protective devices and shall be selected in accordance with the kW/current rating.

Contactors shall be triple-pole electromechanically operated air-break type, held in or latched pattern as specified.

Contactors shall be classified as utilisation category AC3 uninterrupted duty for motor starting and as utilisation category AC1 intermittent duty, Class 1, 60% for heater duty.

Contactors shall be fitted with the required auxiliary contacts. These shall be rated at not less than 6A and shall be positively driven in both directions.

Auxiliary relays for control purposes shall be of the multiple pole type and shall preferably possess the feature of field convertible contact configuration.

Auxiliary time delay relays shall be of electronic or synchronous motor-driven type and the time setting shall be infinitely adjustable over the range of 5 - 100% of the maximum delay. Timing relays deriving the delay function by thermal or pneumatic means will not be acceptable.

Auxiliary relays shall have a minimum of 4 individual contacts and shall preferably have the facility to add an extension block with an additional four (4) individual contacts.

***Control switches and pushbuttons***

Control selector switches shall be of a rotary spring-loaded type, with an AC11 rating, and shall have clearly identified switch positions. Where switches are lockable, the key shall be held captive in the abnormal or over-ride position.

Pushbuttons shall comply with SANS 60947-5-1 and shall be of a 22mm diameter, flush bezel type. Emergency stop pushbuttons shall be of a mushroom headed push to stop, stay-put and twist-to-release type. Key type release buttons shall not be used.

Pushbuttons shall be coloured as follows:

<b>Function</b>	<b>Colour</b>
Start	Green
Stop	Red
Reset	Black
Emergency Stop	Red
Lamp Test	Black
Close	Green
Open	Green
On	White
Off	Black
Forward	Green
Reverse	Green

Pushbuttons shall be of the one-hole fixing, oil tight pattern.

Contacts shall be adequately rated for the circuit duty but shall not be less than 10A, 230V AC or 120V DC rating.

In addition, the operator shall carry an internationally acceptable symbol indicating its function or shall have mounted immediately above it a clear legend of its function or action.

***Indicating lamps***

Indicating lamps shall be suitable for use on either 230V AC or 24V DC control supplies, and shall be light emitting diode (LED) type. Lamps suitable for use on 230V AC shall incorporate a step-down transformer. Indicating lamps shall be continuously rated for a voltage of 10% in excess of the rated voltage.

Lamps shall comprise 22mm diameter units incorporating either a multi-cluster array of LEDs or a single high intensity surge protected LED; replaceable from the front of panel without any special tools.

Unless detailed otherwise in the Project Specific Specification, the MCC shall be provided with indicating lamps coloured in accordance with the primary colour coding scheme, which shall be as follows:



Function	Colour
Emergency / hazardous condition	Red
Emergency stop operated	Yellow
Alarm / abnormal condition	Yellow
Tripped / fault condition	Yellow
Warning	Yellow
Normal condition	Green
On	Green
Running	Green
Closed condition	Green
Open condition	White
Available	White
General indication	White
Mandatory operation required by operator	Blue

**Power measuring instruments and current transformers**

Display instruments used to indicate voltages and currents shall be preferably digital instruments, shall comply with IEC 60051 and have an accuracy class of 1.5. They shall be flush front of panel mounted.

External zero adjustment for all analogue instruments shall be possible on all indicating instruments to facilitate adjustment without dismantling the instrument.

Instruments shall be scaled to 120% of the anticipated designed indication. Ammeters shall be provided with compressed scales to accommodate motor starting or other in-rush currents, and ammeters monitoring motor currents shall be provided with an adjustable red pointer to indicate full load current.

Meters and relays shall be capable of withstanding, without damage, the secondary currents associated with the maximum available through fault current.

Instruments shall be provided with shrouded connections to their rear, and ammeter circuits with a full-scale deflection in excess of 25A shall be connected via current transformers (CTs). Apart from CT and ammeter circuits, instrument circuits shall be fused.

They shall provide data output signals for presentation to PLC, SCADA, telemetry, etc.

Where the Project Specific Specification indicates that instruments shall provide fieldbus communication with a control system, this shall be via an open protocol compatible with the proposed control system.

Run hour meters shall be of a 5-digit minimum non-re-settable odometer type, with visual indication of operation, and a minimum resolution of one hour.

Current transformers (CTs) shall be air insulated, shall comply with SANS 60044, and shall have short circuit ratings in excess of those prevailing at the point of connection. They shall bear individual rating plates, which shall clearly identify the winding polarities (primary or secondary), together with the connection details of any multi-ratio windings.

Current transformer accuracy classes shall be selected as follows unless otherwise indicated on single-line diagrams:

Type of circuit	Class	Comments
Indication	3 or 5	To match the % accuracy of the instrument
Measurement	0.5 or 1	To match the % accuracy of the instrument
Motor protection	10P10	Or as required by protection device manufacturer
Power system protection	10P20	Or as required by protection device manufacturer
Power system unit protection	X	As specified by protection device manufacturer

One pole of the secondary winding of each CT (or group of CTs) shall be connected to earth via a link. All connections to the CT secondary winding shall be made via a proprietary shorting terminal test block. Provision shall be made for attaching test links.

Current transformers shall be of the low-impedance type and shall, where ratio, class and output requirements permit, preferably be of the ring-type bar-primary design.

Current transformers shall be rated to withstand the thermal and magnetic stress resulting from the maximum available through fault current.

Bridging terminals for current transformers shall be provided at the outgoing terminals where external connections are required. In addition, terminal blocks shall be provided to permit secondary injection tests on protective relays.

**Variable Frequency Drives (VFDs)**

The VFD motor starter shall comprise a variable frequency converter (VFC) , phase shift transformer(s) (where required), and all other components necessary to provide the full speed and torque control of an a.c. cage induction motor over the specified operating speed range up to the motor’s rated speed and full load current.

Unless otherwise specified in the Project Specific Specification, VFCs shall have uncontrolled rectifiers (i.e. diode front-end) with the specified pulse number (6/12/18). Either a.c. line reactors or d.c. link chokes shall be provided with all 6-pulse VFCs to reduce input current harmonics.

Where a phase shift transformer is required to achieve the specified rectifier pulse number, the transformer shall be provided as an integral component of the VFD and, unless otherwise specified in the Project Specification, shall be of the dry type and housed in a dedicated section of the VFC enclosure.

VFDs shall be capable of operating under the service conditions specified in Clause 4 of SANS 61800 Part2, the Site Conditions specified in Section B: 3.2 above and the service conditions specified in the Project Specific Specification. Functional features and performance requirements shall be in accordance with Clauses 3 and 6 of SANS 61800 Part 2 respectively as varied.

The output rating of the VFDs shall be selected to suit the associated motor and shall take into account the operating speed range.

Every VFD motor starter shall be provided with incoming supply isolation and short circuit protection as well as an input contactor if specified in the Project Specific Specification.

The VFD shall provide the specified motor protection either as an integral part of the VFD or by way of a separate motor protection relay.

Where any semiconductor or special d.c. circuit fuses are used in the VFD power circuit, a spare set shall be provided. A list of all fuses, type, ordering code and supplier and supplier details shall also accompany the spare fuses.

The VFD control system shall incorporate comprehensive diagnostics to provide fault supervision and status indication in accordance with Clauses 3.2 and 3.3 respectively of SANS 61800 Part 2 and any additional requirements specified in the Project Specific Specification.

The Contractor shall ensure that the suppliers of the VFD and the associated motors confirm that their standard equipment is fully compatible and, if not, that the necessary equipment design changes (e.g. enhanced motor insulation) and/or supplementary equipment (output filters or reactors) is provided to ensure compatibility.

The MCC shall permit adequate heat rejection from the VFD compartments and the Contractor shall provide estimates of the total heat rejection from the MCC. The location of the MCC and VFD panels, and the ventilation arrangement, shall be as specified in the Project Specific Specification.

All VFDs shall comply with the requirements of product standard SANS 61800-3 for Category C2/C3 as appropriate and an EMC filter shall be provided as part of a VFD if necessary, to achieve the required electromagnetic compatibility.

Any VFD input harmonic filters or line reactors and any output filters (i.e. dU/dT, common mode or sine filters) or reactors shall be provided as part of the VFD and shall be included in the supply price. Output filters shall be provided where required to ensure motor insulation compatibility and/or control of bearing currents. Output reactors shall be provided if motor supply cables exceed the allowable length.

The design of dedicated VFD input harmonic filters shall take account of the supply impedance provided in the Project Specific Specification, any background voltage harmonics, any other reactances (e.g. transformers) or capacitors (e.g. power factor correction), or other filters connected to the power system, so as to avoid possible resonance problems.

The VFD control panel/operator interface shall be mounted on the front of the MCC panel doors. Control parameter adjustment shall be easily achievable by menu-driven option selections, with engineering options protected from unauthorised changes by the use of multi-level password protection.

All operator controls and indications shall be available front of panel, either via an operator interface/keypad, or by using discrete push-buttons and lamps, etc.

The VFD shall incorporate on-board protection, control and monitoring features, which shall include, as a minimum, the following:

15. On
16. Unit ready
17. Overload
18. Failure
19. Current limit
20. Over voltage
21. Manual start and stop

22. Raise and lower speed
23. Current operating status
24. Speed indication

The VFD shall be such that when set in the 'manual' mode, operation from the control panel/operator interface shall be as follows:

25. a start command shall cause a normal ramped start up to the pre-set speed;
26. a stop command shall cause a normal ramped down stop and shutdown of the drive.

All diagnostic and fault messages shall be stored, whether reset or not and it shall be possible to recall them from the operator interface/control panel.

All VFD function parameters shall be programmable from a dedicated keypad, or via a standard programming software package to be provide to the Commissioning Engineer and the Client at no additional cost. A serial communications port to RS232/RS485 standard or other network communication port shall be provided for dedicated communication with the VFD, and via which all programmable, control, monitoring and diagnostic functions available locally at the VFD shall be accessible.

A copy of the configuration/standard programming software shall be provided with each VFD.

The motor starter control circuit supply shall be provided with a functional test facility, whereby the functionality of the control circuit and its equipment and components can be fully demonstrated with the compartment door(s) open, but whilst the motor circuit supply remains isolated at the functional unit isolating device.

A control selector switch shall be provided for 'Normal/Test' selection inside the relevant compartment.

The test supplies shall be arranged to be de-energised when the motor circuit supplies are energised. The test supply shall be provided with short circuit protection, and shall be capable of isolation.

### ***Motor protection***

As a minimum, every motor starter circuit shall be provided with a thermal overload unit connected to monitor the current in each energised winding of the motor. Unless otherwise specified in the Project Specific Specification, motors of over 30kW shall be provided with electronic overload protection, and motors of over 75kW shall be provided with electronic motor protection relays. Intelligent multifunction electronic relays shall be provided if specified in the Project Specific Specification.

Thermal overloads shall be scaled and adjustable such that the motor rated current is midrange, and shall provide a temperature compensated thermal element for each supply phase to the motor. The unit shall provide single phasing protection, and incorporate auxiliary tripping contacts with a manual test facility. The unit shall be capable of being manually or automatically reset (set to auto). Unless otherwise specified in the Project Specific Specification, thermal overloads shall be trip class 10.

Electronic overload units shall incorporate the features required of a thermal overload, together with provision for the adjustment of tripping and reset times. In addition, stalled rotor protection shall be provided, together with integral thermistor protection where required. Where required, electronic overloads shall be suitable for use in conjunction with power electronics (soft starters or variable frequency converters).

Electronic underload protection shall be provided for all centrifugal pump, fan, or directly driven mixer motor circuits above 30kW. When detecting underload, the device shall measure the true motor power (and not just the phase angle), shall be configured to detect an unloaded running motor condition, and shall incorporate start delay, motor trip, and manual/auto reset (set to auto) facilities. The unit shall incorporate a digital percentage load display.

Where required on drives of less than 30kW, the underload unit shall be provided with overcurrent protection providing the same facilities as a thermal overload. When required on larger drives, underload protection shall be provided as an integral part of an electronic overload or motor protection relay, and where applicable shall be suitable for use in conjunction with power electronics.

All protection devices shall operate in a fail-safe manner via electrically maintained relays which de-energise on a fault condition. On sensing a trip condition, the devices and relays shall electrically lock out the emergency stop circuit, and shall be reset manually using a front of panel common fault reset pushbutton. In addition, they shall automatically reset on control supply switch on and upon power restoration in the event of a power loss.

Electronic motor protection relays and digital overload and underload devices which provide operator interfaces shall have front of panel mounted displays and controls.

### ***Busbar and Busbar Trunking***

The main distribution circuit through the Switchboard or MCC shall comprise a main and distribution busbar system, comprising of 3 phase and neutral busbar system. The rated current of the busbar system shall match the rating of the main incomer.

All main and distribution busbars, risers and droppers shall be air-insulated and shall be fabricated from hard drawn, high-conductivity copper. Aluminium busbars will not be permitted. Busbars shall be tinned for waste water treatment works (WWTW) applications. If pre-tinned copper work is provided, cut surfaces may remain bare, providing the current path is unaffected and suitable contact lubricants are used before tightening joints.

Main busbars shall be enclosed together within the top of the Switchboard or MCC. No other conductors shall be run in the busbar compartment. Access to the busbars shall be through covers, requiring the use of a tool for removal. All internal fixings shall be held captive. No components shall be placed in a busbar compartment.

Main and distribution busbars shall be continuous over each section, extending to over the full length of the Switchboard or MCC with the same current rating and cross-sectional area throughout their length.

Main busbars, distribution busbars and all flexible connections, shall be adequately sized, braced and supported to withstand any electromagnetic forces and thermal effects to which they may be subjected, including the occurrence of fault currents, up to the full fault levels specified.

The vertical riser buses shall be copper full height and rated for the section total load. Small openings in the vertical barriers shall permit the plug-on control unit contacts to pass through and engage with the vertical bus bars. Unused plug-on openings in the vertical barriers shall be equipped with plastic snap-in closing plugs.

All busbar connections shall use joints secured against loosening. Joints and Tee-off connections in busbars shall be made by means of high-tensile bolts, nuts and approved locking washers. A

minimum of two such bolts shall be used per joint or tee. The joints shall not be taped in order to facilitate visual inspection and checking of bolt tensions. The joint contact areas shall be smooth, very flat and polished or tinned for dry jointing.

Busbars shall be provided with phase colour markers, red, white, blue (and black in the case of four wire systems). Such colour identification may take the form of coloured bands at intervals along the busbar run of not more than 800 mm. The combined width of the colour bands per phase shall not be less than 300 mm per 800 mm busbar length. The use of the convention, Red, Rear, Right shall be employed.

The maximum length of any cable connections from a busbar shall be 1000 mm.

### ***Internal Wiring and Field Connections***

#### ***General***

All wiring within the Switchboard or MCC shall run directly between terminals, without any joints or other connections. Wiring shall be carried out using multistrand, single-core PVC-insulated copper conductor, 660/1 000V grade (minimum), to SANS 1507, sized and derated where required for the currents to be carried. Single-strand conductor shall not be used and no conductor shall be less than 1.5mm<sup>2</sup> cross-sectional area.

All bus wiring and interconnections between compartments within the Switchboard or MCC shall be contained within the enclosure, and shall be segregated in wire-ways separate from other compartments. Where such wiring is terminated in a compartment, it shall be segregated from all other wiring in that compartment. All wiring and cabling entering or leaving a compartment or passing through a partition shall do so via a permanently fixed bush.

Wiring between components shall be:

27. carried out in a neat and systematic manner,
28. contained in non-metallic trunking, and
29. run to compartment doors in spiral wrapping or netting.

Any wire containment system shall securely locate the wiring, and provide 25% spare capacity on completion. Cableways shall have furthermore sufficient space to enable the installation and removal of any cable without the need to remove any other cable or component. Cableways shall incorporate adequate facilities to locate and support the cables.

Wiring on compartment doors shall be similarly supported, and shall be provided with support and protection across the door to compartment side wall transition, whilst permitting the door to be fully opened without straining the wiring. Wiring system accessories shall not deteriorate with heat or propagate flame.

Wiring shall be segregated according to need; circuits that enter the compartment without isolation shall be separately segregated and loomed with spiral wrapping and identified. Control circuits shall be wired in twisted pairs or screened cables, and together with data network cabling, shall be physically segregated from power circuits by barriers. If lightning and/or surge protection measures have been used to protect individual circuits, these circuits shall be segregated from the wiring of other unprotected circuits.

Cable-ways or chambers shall not contain any equipment or components.

Where field cables are terminated other than in the base of the enclosure, cable-ways or cable chambers shall be provided to transport the cables through the enclosure to the compartment or

cable box at which they are glanded or terminated. Careful thought should be given to the termination of power cables and their location within the assembly.

### ***Gland Plates***

All field cables and wiring shall enter the enclosure through gland plates, which shall be located so as to facilitate the spreading of cable cores.

Gland plates shall be rigidly supported and maintain the IP rating of the enclosure.

Gland plates and cable boxes shall minimise the effects of eddy currents and be suitable for the type of cable used. Single core cable gland plates shall be made of non-magnetising material.

Gland plates for bottom access cabling shall be located at least 300 mm above the finished floor level. Each compartment gland plate shall be an integral part of the construction of that compartment.

### ***Identification***

All wires shall be identified at both ends using colour coded alpha-numeric ferrules. Within a compartment, a wire shall have the same identifier at both ends; and this identifier shall not be duplicated within a functional unit.

Components and wiring shall be installed such that the identification of every wire is clearly visible and readily accessible on completion of the Assembly installation at site. Horizontal wiring identifiers shall be read left to right, and vertical wiring identifiers shall be read bottom to top.

All conductors shall be identified in conformity with the approved circuit and connection diagrams. No number shall be used more than once in each panel except where electrically identical. Wires/conductors shall have the same number on either end of the wire and all wires which are electrically identical shall have the same wire number.

### ***Termination***

Wiring shall be terminated using crimped cable ends, lugs or any other approved method that is appropriate for the conductor size and type of termination. All of the strands forming the conductor shall be connected at the point of termination. Soldered connections shall only be used on electronic equipment where it is not practicable to use any other termination method.

Wiring with a cross section area of less than or equal to 6mm<sup>2</sup> shall be terminated in terminals mounted on DIN rail. Wiring with a cross section area of greater than 6mm<sup>2</sup> shall be terminated in bolted terminals.

All wiring entering or leaving a compartment shall do so via terminal rails, with the exception of specialised signal or data circuits, which may be cabled directly to dedicated connections on electronic equipment located at the periphery of the component mounting plate.

The conductor shall be clamped in such a manner that the captive clamping screw does not come into contact with the conductor. Conductors of cross-section above 16mm<sup>2</sup> shall be terminated using stud type terminals; similarly mounted and grouped on DIN rail.

No more than two conductors shall be connected to one side of a terminal. Where it is necessary to connect adjacent terminals together, proprietary shorting bars or combs shall be used.

Spare cores shall be terminated at both ends or tied back, but shall not be cut short.

All terminals shall be protected to IP2X, including stud type terminals; which shall be shrouded to achieve this. Terminals shall be segregated according to function and operating voltage; by

grouping or by terminal rail mounted partitions or barriers. All stud type terminals shall be provided with individual segregating barriers.

All circuit terminal rails shall include 10% spare space.

Terminals shall be grouped together and segregated according to operating voltage and function by terminal rail mounted barriers. Stud type terminals shall be provided with individual segregating barriers.

Terminals shall face the compartment door for ease of connection.

Terminals shall be located and spaced so as to enable the easy disconnection and reconnection of conductors, whilst providing sufficient space for the looming and spreading of cable cores.

Where practicable, the layout of terminal rails shall be such that cores from the same field cable are not split between non-adjacent groups of terminals.

All wiring of external connections shall be brought out to individual terminals on a readily accessible terminal block.

All spare contacts are to be wired back to terminals.

### ***Earthing***

The Switchboard or MCC shall incorporate facilities for connecting to the main incoming earth terminal, subject to its location being clearly identified and easily and safely accessible with the Switchboard or MCC energised. The Switchboard or MCC earthing system may comprise either an earth bar extending the full length of the Switchboard or MCC or, for Switchboard or MCC with less than or equal to two (2) functional units and a supply rating of less than 100A, a stud arrangement.

Earth bars shall:

30. be manufactured from high conductivity copper (tinned for WWTW applications);
31. be located in a safe and easily accessible position;
32. have a minimum number of joints;
33. have at least one disconnecting link;
34. have facilities for connection to the main incoming earth terminal (the Municipal/Eskom earthing system and/or from a local earth electrode system) at each end of the bar;
35. be rated and tested at a minimum of 60% of the busbar fault withstand capacity;
36. have a cross-sectional area of not less than 500mm<sup>2</sup>, nor less than 50mm in width;
37. be securely connected in each panel or cubicle to bare metal.

Provision shall be made for the connection for the following connections to the fixed portion of the earth bar:

38. electrical installation main bonding conductors;
39. functional earthing conductors external to the Switchboard or MCC;
40. equipotential bonding conductors external to the Switchboard or MCC;
41. other equipment protective conductors external to the Switchboard or MCC;
42. the Switchboard or MCC main earth bar/circuit, which shall be terminated onto the fixed portion;
43. an additional 2 No. spare terminations.

All metallic non-current carrying parts of the Switchboard or MCC shall be bonded together and connected to the Switchboard or MCC earth busbar.



Each compartment shall include an earth stud connected to the main earth bar or stud by separate connections or by a common vertical earth tape. Earth conductors to each compartment shall be sized to withstand the fault level, subject to a minimum cross-sectional area of 6mm<sup>2</sup>.

The following shall be directly connected to the compartment earthing terminal by earthing conductors with a minimum cross sectional of 4mm<sup>2</sup> or braided straps of similar rating:

44. compartment door,
45. any removable cover,
46. component/equipment mounting rails and earth terminals.

A compartment may contain subsidiary earth terminals or bars to which the following circuits may be specifically connected:

47. 'clean' earths from instrumentation circuits and equipment,
48. functional earths; e.g. from telecommunications equipment,
49. surge protection earths; e.g. direct connections from lightning protection units.

These earth terminals or bars shall be separately connected directly back to the Switchboard or MCC main earth bar with 6mm<sup>2</sup> minimum cross-section conductor.

Cable gland plates associated with a compartment shall be provided with an earth stud, which shall be connected directly to either the compartment earthing terminal, or to the main earth bar, with a conductor of 6mm<sup>2</sup> minimum cross-sectional area.

Doors having components mounted on them shall be bonded to the main structure by means of flexible copper earth connection arranged so that it cannot be trapped as the door is opened or closed. Metal hinges shall not be considered sufficient to ensure electrical continuity.

Where cables carry low level high frequency signals, or are installed where there is a significant risk of high frequency interference; (e.g. in signal circuits connected to equipment containing power electronics), they shall where necessary have their screens/braids capacitively connected to earth in a proprietary manner, and proprietary means shall be included to provide 360° earthing for field cable braids/screens.

### ***Labelling for Switchboards and MCCs***

Safety signs and labels shall be provided wherever necessary in relevant languages so as to unambiguously communicate safety and functional guidance to any person who may operate the Switchboard or MCC or otherwise come into contact with any part of the electrical system forming a part of the Switchboard or MCC, and shall be provided for the specific identification of every component contained within the Switchboard or MCC.

Signs and labels shall be located in such a manner that:

50. it is obvious as to the nature and location of the hazards or component(s) to which they relate,
51. when mounted on any enclosure cover or plate, there is no possibility of that cover or plate being interchanged with any similar item on that Switchboard or MCC or on any other MCC/DB supplied to the same site,
52. they are not fixed to easily removable parts (e.g. trunking covers, etc.), unless their purpose is to warn of the consequences of removing a removable part,
53. they are at all times adjacent to the item to which they refer, and accommodate situations where components could be moved along a DIN mounting rail,

54. they will not be obscured by any equipment, components, or wiring, etc,
55. they are legible and will remain easily read throughout the life of the Assembly,
56. Signs and labels shall be securely and permanently fixed using an appropriate number of corrosion resistant, mechanical fixings. The fixing of labels, safety signs and notices shall not affect the IP rating of the Switchboard or MCC.

Short individually fixed labels covering several items only, shall be used in lieu of long multi-legend labels; e.g. above a row of indicator lamps.

Safety signs and labels shall be of such size that the legend thereon is clearly legible from the operating position (or a 3m distance), and the pictograph and its accompanying text shall be chosen so as to provide the appropriate communication in an explicit and unambiguous manner.

Safety signs and labels fixed to the outside of the enclosure shall be manufactured from 1.5mm thick anti-reflective polycarbonate with the legend reverse screen printed, or alternatively from 3mm thick bevel-edged clear perspex rear engraved with black characters. Internal labels may be manufactured from a laminated plastic material which shall normally provide a black legend against a white background. Where specifically agreed with the Engineer, internally mounted labels and charts, e.g. for distribution boards, etc., may be of permanently printed plastic, plastic laminated thin card, or thin card protected behind Perspex.

As a minimum, safety signs shall be fitted to removable covers over busbars and live connections, and to doors of compartments containing:

57. incoming supply cable termination points,
58. internal switching and isolation devices,
59. incoming or internal means of isolation; stating the highest voltage controlled by the means of isolation,
60. functional units incorporating capacitors,
61. more than one supply or multiple control circuits originating elsewhere,
62. equipment located in a 'safe area' but associated with certified apparatus located in a hazardous area; a sign shall also be fitted at the safe area cable termination rail.

A safety sign identifying the operating voltage shall be placed in any compartment where there is equipment, components, or wiring, that can be energised at above extra low voltage.

Where there is no suitable standard symbol or pictograph, an application specific sign may be produced using simple and appropriate symbols, pictographs, and text, to indicate the hazard in a simple and straight forward manner that is acceptable to the Engineer.

Multipurpose signs shall be used where there is a need to communicate multiple hazard messages.

The text of every label, excluding individual internal component identification labels, shall be as agreed with the Engineer.

Every Switchboard or MCC shall be provided with a name plate detailing the following:

63. Manufacturer's name or trademark,
64. Manufacturer's contact details,
65. Manufacturer's type designation, serial/identification number,
66. Date of manufacture,
67. Rated operational voltages, frequencies, and number of phases,
68. Continuous busbar rating,

69. Short circuit withstand current and duration,
70. IP rating.

An application name shall be prominently displayed on the Switchboard or MCC, as detailed in the Particular Specification.

Each compartment shall be identified with a designation label which shall include the full plant functional name and the alpha numeric reference cross referenced to as-built drawings and documentation contained in the Operation and Maintenance Manual. For rear access Switchboards or MCCs, a duplicate designation label, mounted adjacent to the gland box, shall also be provided at the rear of each compartment.

The material used shall be selected having regard to the size and fixing methods of the label and the label shall not warp in service. Labels mounted on the outside of the Switchboard or MCC shall be rectangle in form and be manufactured of either:

71. Laminated plastic, engraved so as to produce black letters on a white background,
72. Engraved sandwich board ("Trifoliate", "Darvic" or equal),
73. Reverse engraved acrylic material ("Perspex") with filled letters and reverse sprayed.

For outdoor applications (where specified) labels shall be brass or aluminium (with letters filled in black), lightly sanded with fine grit paper and clear lacquered.

Labels for door mounted components and labels used inside the Switchboard or MCC shall be to the same standard or may alternatively be printed using an approved, propriety system.

Text characters shall be uniform in height, in upper case (except where standard abbreviations of units are used, e.g. kWh, kVA, etc.) and of the following minimum dimensions:

- |                                      |     |
|--------------------------------------|-----|
| 74. application labels:              | 8mm |
| 75. compartment designation labels:  | 6mm |
| 76. information or warning labels:   | 6mm |
| 77. component identification labels: | 3mm |

All components shall be clearly labelled. Internal components shall be clearly identified by individual labels to indicate the equipment to which they relate. The component identification labels shall correlate with the SLD drawings and documentation. If this is not practical due to space restrictions, common labels (e.g. diagrams may be used).

Current transformers shall be provided with separate and individual identification and rating plates.

Each distribution board shall be provided with a circuit chart laid out in a way that matches the orientation and layout of the protective devices in the distribution board.

A typed circuit chart shall be permanently fixed inside each Switchboard or MCC or immediately adjacent to the distribution board. The chart shall be laid out in accordance with the physical arrangement of the protective devices that it is easy to relate the circuit chart details to the appropriate protective device. As a minimum, the chart shall be enclosed in a transparent protective cover attached to the inside of the compartment door.

### ***Installation and Shipping Requirements***

Switchboards and MCCs shall be preferably shipped in sections to facilitate field handling for transportation and installation. The shipped sections shall be joined together to form a complete unit assembly.

Preparation for shipment shall protect the Switchboard or MCC auxiliary devices accessories, etc. against corrosion, breakage or vibration injury during transportation and handling.

Disassembly shall be into the largest components or sub-assemblies possible, consistent with packing, road transport and handling limitations.

All parts shall be clearly and lastingly match marked to facilitate field erection prior to disassembly and packing for transport. Instructions shall be provided for reassembly of sections in the field or accompanied by a qualified representative from the Manufacturer.

The Contractor shall be responsible for delivery including loading and unloading of all equipment to site.

The Contractor shall provide information (in time) regarding specialised handling and storage requirements/techniques for equipment on the site until finally installed in the operating location.

## **LOW VOLTAGE CABLES: GENERAL SPECIFICATION**

### ***General***

Cables shall be manufactured strictly in accordance with SANS 1507.

Cables shall be delivered, stored and handled in accordance with the manufacturer's instructions.

Where the performance of the cable is likely to be adversely affected by the ingress of moisture, it shall be adequately sealed at both ends.

Cable selection and sizing should comply with SANS 10142-1. Cables and their wireways shall, where required by SANS 10400 Part T to be protected against the effects of fire, be selected and installed in accordance with the provisions of such code.

Cables shall have copper or aluminium conductors according to SANS 1411-1. Cores of cross-sectional area greater than 1.5 mm<sup>2</sup> shall be stranded or flexible.

Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the Particular Specification and drawings.

Unless otherwise specified, all LV cables shall have copper conductors to SANS 1411-1. Cores of cross-sectional area greater than 1.5 mm<sup>2</sup> shall be stranded or flexible. Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the design documentation and drawings.

All LV cables used in an electrical installation shall be as specified in the Particular Specification (or cable schedule as part of the Particular Specification) and shall comply with either of the following:

78. PVC/SWA/PVC

- Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
- Single core cables shall have aluminium wire armouring.
- Multicore cables comprising five conductors and above shall have each core individually coloured, or, where not available, be coloured white with phase identification in black numerals.

79. XLPE/SWA/PVC

- Cables shall comply with SANS 1507-4 and be rated at 600/1000 V.
  - Single core cables shall have aluminium wire armouring.
80. PVC/PVC
- Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
81. XLPE/PVC
- Cables shall comply with SANS 1507-4, and be rated at 600/1000 V.
82. Single Core PVC
- Cables shall comply with SANS 1507-2 and be rated at 600/1000 V.
  - The insulation shall be phase coloured, and, where used in single phase systems, line cables shall be red, neutral cables black and earth cables yellow and green.
83. Flat Twin and Earth PVC
- Copper conductors shall comply with SANS 1411-1, PVC insulated to SANS 1411-2, laid up with a bare copper earth continuity conductor between them, with PVC bedding to SANS 1411-2.
  - Cables shall be rated at 300/500 V.

### ***Installation of Cables***

The cable installation shall comply with the requirements of SANS 10142-1.

Cables shall be installed strictly in accordance with the cable route drawings.

Cables installed in groups shall run in straight lines and not cross over each other, except where transposing of cables is required to reduce capacitive or inductive effects.

Cables installed above ground shall, as far as possible, run parallel with the lines of building construction. Cables and wireways shall then only be installed in horizontal and vertical runs, and the installation shall be as visually unobtrusive as possible.

Cables buried below ground shall, as far as possible, follow features of the site such as roadways and building lines.

Cables and their support systems shall not be fixed to protective barriers, guards or directly to guard-rails.

Cables shall not be exposed to direct sunlight after installation. If the cable route compels the support system to be in direct sunlight, the Contractor shall ensure cables are covered with a suitable canopy or cover of the same material as the support system (tray). Cables shall be installed strictly according to the manufacturer's requirements.

No joints or repairs to outer sheathings or insulation shall be allowed in low-voltage cables without the prior approval of the Engineer.

Propriety (i.e. suited to and manufactured for such use) cable support systems shall be used.

Unarmoured cables shall only be used with the approval of the Engineer and where there is no risk of mechanical damage.

### ***Cable Trenching***

The proposed trench route shall be surveyed for the presence of underground cables and/or services before digging commences.

Where surplus material has to be disposed of, the Contractor shall remove it from site and dispose of it in a location of his choosing in accordance with statutory environmental regulations.

The cable trench shall be excavated along the routes indicated on the relevant drawings.

Should the Contractor, during the excavation operations, come across obstacles (or other interferences, e.g. soil drenched with hydrocarbon-based solvents such as spilt oil, which could adversely affect cable insulation), the Contractor shall report the matter to the Engineer, who shall then advise an appropriate course of action.

The bottom of the trench shall be level and shall follow the contours of the final ground level. Where the excavation is in excess of the required depth, the excavation shall be backfilled and compacted with suitable material to the required depth.

The Contractor shall remove all sharp projections, which could damage the cable where the trench is excavated through rocky formations, and shall remove all loose rocks, material, etc. from the bottom of the trench.

Trenches shall be excavated to a maximum depth of 500mm for all LV cables with a width of 300 – 450mm.

The following minimum clearances shall be maintained:

Service	Vertical	Horizontal
Data and Telecom Cables	300mm	300mm
Water pipes	300mm	300mm
Sewer pipes	300mm	800mm
Storm water pipes	300mm	600mm
LV cables on same route	100mm	One cable diameter of larger cable

Where a cable will cross over other services, the cable shall not be installed at a depth less than 600mm below ground level, and if this is not possible the cable shall be installed underneath the other service and shall be protected in the prescribed manner by means of concrete slabs. The depth of the cable shall be maintained for one metre on either side of the crossing.

Sufficient lengths of cable shall be left at the beginning and end of the cable routes to allow for the termination of the cables. The Contractor shall take the necessary precautions to protect the cable ends until they are terminated. The cable ends shall be sealed by means of lead or heat shrink sealing caps to ensure that the cable is waterproof.

The excavated material shall be backfilled in layers of 200mm and shall be well compacted and consolidated to 90% MOD AASHTO. Where the Engineer deems necessary, the Contractor shall use a mechanical vibrator to compact the trench.

Electrical warning tape, consisting of two tapes laid side-by-side and overlapping (such that their combined width is 150% of a single tape width), shall be installed on all cable routes (LV and MV), 200mm above the top cable layer. Where a cable route exceeds 600mm in width, multiple warning tapes shall be run, in such a way that the space between adjacent warning tapes does not exceed 150mm.

Where cables cross other services such as water pipes, sewage pipes and other cables, or where the chance exists that the cable may be damaged as a result of excavation by others, the cable

shall be protected by means of reinforced concrete slabs. The slabs shall protect the cable for a distance of 500mm on either side of the crossing.

### ***Cable Sleeves/Ducts***

Cable sleeves that are required for road, street or driveway crossings shall be minimum 110mm PVC unless otherwise specified.

The Contractor shall liaise with the main civil contractor at all times for the proposed road, street or driveway crossing points including pipe sleeves required for building access.

Where possible, sleeves should be supplied and installed by the civil contractor unless otherwise specified.

### ***Cable Management Systems***

Cable management systems (cable trays, cable ladders and cable mesh) shall be selected and installed strictly in accordance with their manufacturer's guidelines, with a safety factor of 1.5 after taking into account maximum permissible loading and all external factors (not limited to wind, snow and thermal expansion). Upon demand to do so, the Contractor must furnish all data and calculations he used to derive the type and spans of the systems to the Engineer.

Notwithstanding above, the deflection of a cable management system due to installed cable weights shall be, in accordance with IEC 61537, limited to 1/100th of the span.

Except where it is to be installed in locations with corrosive atmospheres, cable management systems shall be manufactured of galvanized and/or epoxy-powder coated steel. In locations with corrosive atmospheres, systems shall be manufactured from stainless steel (316 Marine Grade) or aluminium.

All clamps, clips, hinges screws, bolts, nuts and support fittings used for fastening cable trays or cables shall be of the same material as the cable management system itself.

Over and above the requirements of SANS 10142-1, all cable tray and ladder systems that will support telecommunication and/or control wiring shall be bonded in accordance with NRS 083-2 (gives details of bonding methods that provide enhanced protection against the effects of electromagnetic cross-interference).

Cable management systems shall be selected and installed such that spare capacity (weight as well as height and width) of 20 % will be available for the addition of future services (the cable management system to still exhibit a 1.5 safety factor after services were added).

All cable trays shall be of the heavy duty, increased upstand ("siderail"), type.

Metal cable trays shall be manufactured from base-perforated (in excess of 30% of the surface area, in accordance with SANS 10142-1, in other words, class D according to Table 4 of IEC 61537) rolled steel. Metal trays manufactured to the following standards shall be used:

84. Less than 150mm wide: 1.2mm minimum thickness with 12mm minimum upstand.
85. 150mm to 450mm: 1.2mm minimum thickness with 19mm minimum upstand.
86. Above 450mm (heavy duty): 2.5mm minimum thickness with 76mm upstand.

The edges of cable trays are to be turned up on both sides to improve rigidity (return flange cable tray), and, where necessary, the sides of trays shall be reinforced with galvanised steel angles, minimum 25 x 25 x 3mm, with 25 x 3mm cross-braces at 600mm centres.

Metal cable ladders shall have side rails with 2 mm minimum thickness. Cross rungs shall be spaced at maximum intervals of 300mm (measured between the centres of rungs). Where cables of 10mm<sup>2</sup> or smaller are installed on cable ladders, the spacing of cross rungs shall be reduced to 125mm.

Cable ladders consisting of slotted metal rails which accommodate plastic or metal cable binding bands may be used in vertical cable runs against walls, etc. These cable ladders will be considered in horizontal cable runs for small cables for communication and control wiring only after approval by the Engineer.

Cable tray and ladder connections shall be suited to and of the same manufacture as the linear sections that they connect.

The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected.

Fixing materials shall be compatible with cable management system materials, and offer resistance to corrosion.

Cable trays and mesh shall be mounted with a minimum air gap of 25mm between the underside of the tray and the mounting surface.

## **EARTHING**

### ***General requirements for earthing and earth grids***

The earth grid shall be constructed in the form of a rectangular arrangement of conductors buried in trenches and divided by longitudinal and transverse conductors into a number of smaller rectangles having mesh dimensions as specified in the relevant layout drawing.

The horizontal conductors for an earth grid shall be high-conductivity, annealed, stranded bare copper conductors with a cross-sectional area of 70 mm<sup>2</sup>.

Where horizontal conductors cross each other, they shall be joined by exothermic welding or oxy-acetylene brazing.

Horizontal conductors shall be buried directly in the ground at 500 mm below finished ground level, in 300 mm wide excavated trenches which shall be backfilled in well-compacted layers.

Earthing conductors shall be provided to link earthing bars to earth electrodes or grids, except where the conductor ends of ring and foundation earth electrodes are terminated at the earth bars. Earthing conductors shall be bare 70 mm<sup>2</sup> annealed stranded copper conductors, unless otherwise specified in the Drawings.

Earth continuity conductors (ECCs) shall be provided:

87. With supply cables to MV switchgear and to LV MCCs/DBs as specified,
88. To earth the exposed conductive parts of all electrical equipment in accordance with SANS 10142: The Wiring of Premises.

ECCs for MV equipment shall be connected from the MV earthing bar and ECCs for LV equipment shall be connected from the earthing bars in the LV MCCs/DBs from which the equipment receives supply.

ECCs shall be separate conductors or shall form part of the equipment supply cables as specified in the Project Specific Specification. ECCs which does not form part of a cable shall be annealed copper stranded conductors of the specified cross-sectional area and shall be either bare or PVC-insulated as specified in the Project Specification.



Unless otherwise specified, the mini-sub MV earth bar shall be separately connected to the closest indoor main earthing bar with a 70 mm<sup>2</sup> bare copper earth conductor.

Where the protective earth conductor forms part of the supply cable to an LV motor, it shall be connected to the earth terminal inside the motor terminal box.

Metal sheaths, metal screens and armouring of single-core cables shall be earthed at both ends of the cables.

### ***Earthing of Standby Generation***

A LV standby generator shall be earthed in accordance with SANS 10142-1: The Wiring of Premises Part 1: Low-voltage Installations.

The earthing connection shall be made with 70 mm<sup>2</sup> bare copper earth conductor via the installation's main earthing bar(s).

The Neutral (star point) of the main alternator from the generator shall be solidly earthed to the main earth grid using 70 mm<sup>2</sup> bare copper earth conductor.

## **TESTING & COMMISSIONING**

### ***General requirements for testing***

The installation shall be inspected and tested in accordance with SANS 10142-1.

Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.

Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using proforma documentation (test certificates and schedules) complying with SANS 10142-1.

The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.

Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

On completion of manufacture, the Assembly shall be subjected to a factory acceptance test (FAT), comprising the Manufacturer's in-house tests, and the repeat tests witnessed by the Client and the Engineer.

Once the witnessed FAT has been carried out, signed off, and any remedial works have been completed and re-tested, the Assembly is ready for delivery to site. Once erected in position, the Assembly shall be subjected to a witnessed site acceptance test (SAT).

Once the SAT has been carried out and signed off, any remedial works shall be completed and re-tested. Plant installation and site cabling will then be carried out by others, and on its completion, witnessed commissioning shall commence.

The manufacturer shall allow for each test (apart from in-house tests) to be witnessed by both the Client and the Engineers simultaneously. An individual testing activity shall not be considered to

have been completed until any results have been recorded, and it has been signed off by the Engineer.

The manufacturer shall provide the Client and Engineers with all reasonable facilities, including testing staff and test equipment, to carry out the inspections and tests, and to check the Assembly for compliance with all of the Client's requirements.

In order to demonstrate the functionality of each circuit, external devices shall be simulated in a representative manner. A small motor shall be used as a test load where motor starters incorporate power electronics. During development, software may be electronically verified away from the Assembly using a simulation/diagnostic package; notwithstanding this, control systems shall be witnessed tested with the software loaded into the programmable devices, and with simulation of the physical I/O devices.

Where the Assembly incorporates equipment requiring special testing facilities or procedures, the manufacturer shall ensure that appropriate resources are available; including where necessary, representatives from the equipment Manufacturer.

### ***Factory acceptance tests (FATs)***

The manufacturer shall perform his in-house works tests in accordance with the proposed FAT procedures, and shall satisfy himself as to the accuracy and quality of the manufactured Assembly in accordance with the accepted design. Once the in-house FAT has been carried out, signed off by the manufacturer, and any remedial works have been completed and retested, the tests shall be repeated and witnessed by the Client (if required) and the Engineer.

The in-house and the witnessed FATs shall check compliance with SANS 60439-1, and shall include the following:

89. A thorough external and internal visual inspection.
90. Confirmation of adequate earthing.
91. Secondary injection testing of all protective circuits shall be carried out, except where discrete current transformers are used; in which case sufficient primary injection testing shall be carried out to prove the ratio and the polarity.
92. Insulation tests shall be performed across all main and distribution busbar joints.
93. All busbars shall be subjected to a single witnessed reduced voltage dielectric 'flash' test; the in-house test shall also be at a reduced voltage.
94. All power circuits shall be subjected to insulation resistance tests.
95. The operation of every mechanical device and interlock shall be verified.
96. All circuits and their functionality shall be tested as detailed in the Control Philosophy and MCC and Local Control Table.

When testing the performance of any software, it shall be demonstrated using the hardware intended to be incorporated within the Assembly, and where this is not possible appropriate operator interfaces, programming units, and terminal units, etc. shall be provided. Where it is necessary to demonstrate an interface with a piece of unavailable equipment to be supplied by others, appropriate means to replicate that equipment and simulate the interface shall be provided.

The Contractor shall ensure that the rates for FATs includes all travel and accommodation for both the Client and Engineer unless otherwise stated. Travel shall include all travel including vehicle

hire and air travel if required. Where the FAT is expected to fall over more than 1-day, appropriate accommodation shall be arranged for the Client and Engineer.

The Engineer reserves the right to cancel and postpone tests if he finds that the Contractor has not made reasonably sure that the test will be successful. Any extra costs incurred shall be borne by the Contractor.

### ***Site acceptance tests (SAT)***

All equipment and every circuit that was altered or disturbed subsequent to the completion of the FAT, or for shipping and site erection, shall be specifically re-tested for integrity and functionality.

During the SAT, all busbar joints that are re-tightened on site shall be subjected to a further Megger test, and all busbars shall be subjected to a single witnessed full voltage dielectric 'flash' test.

The process functionality of each aspect of the control system and its operator interface shall be demonstrated, including the correct operation of all I/O and network links external to the Assembly or not otherwise tested during the FAT.

A CoC shall be provided to the Engineer, before final Testing and Commissioning can start.

### ***Commissioning and other tests***

The manufacturer shall provide attendance during the commissioning of the Assembly, whereby the functionality of the Assembly and its control system and software shall be proven. During commissioning the manufacturer shall make such adjustments, software modifications, and circuit changes, as are deemed necessary to provide the level of plant functionality and performance specified by the Client. All such changes shall be immediately incorporated into the 'as installed and tested' documentation and the Operating and Maintenance Manual, by the Contractor.

The manufacturer shall provide an acceptance document, to detail and record the tests and their anticipated results, and the acceptance document shall have provision for recording and signing off the results.

## **DOCUMENTATION & TRAINING**

### ***General***

All drawings, information, and documentation shall be in English.

Drawings for acceptance shall be provided on paper copies as specified.

The following documentation and drawings shall be submitted to the engineer prior to the procurement or manufacturing of Assemblies and related equipment:

97. Cable block diagrams.
98. General arrangement and elevation drawings, compartment door layouts, typical component mounting plate layouts, and foundation plans.
99. Electrical schematic diagrams showing all equipment and components incorporated into the Assembly. Known circuitry outside of the Assembly and connected to it, shall be shown on all drawings. Drawings shall be cross-referenced using a grid/line reference system.
100. Protective device grading for overcurrent, short circuit, and earth fault/leakage devices

incorporated within the Assembly, together with a schedule of proposed settings that will ensure discrimination.

101. PLC software and configuration documentation; including ladder logic diagrams and HMI display screens, etc. The documentation shall be complete and annotated with purpose, function, duty, cross-references, and descriptions, etc.; sufficient to guide an unfamiliar person through the operation of the software.

### ***Testing Documentation and Reports***

A factory acceptance test (FAT) document shall be provided to the Engineer prior to the witnessed FAT. This documentation shall show the manufacturer's in-house test procedures and results for all items of equipment, components, hardware, and software. The document shall show hardware checks, the software simulation procedures, and their combined functional testing. It shall comprehensively and clearly show the test results of the in-house testing. The subsequent report of the FAT witnessed by the Engineer shall be appended to this documentation.

A site acceptance test (SAT) document shall be produced, which shall detail all tests necessary to demonstrate the functionality of the Assembly following its final erection on site. This shall include details of tests and checks on all circuits disconnected for shipping, together with any equipment, components, wiring, or software altered or incorporated into the Assembly; following the completion of the witnessed FATs.

All drawings, schedules, listings, and other design documentation for acceptance shall be supplied as a comprehensive and integrated package and collated into folders; unless otherwise agreed with the Engineer. Three copies of appropriate documentation shall be submitted on each occasion that agreement is sought.

A Certificate of Compliance (CoC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be reasonably safe.

The FAT, SAT, and CoC shall each have been submitted and agreed with the Engineer, prior to the commencement of final testing and site commissioning.

### ***Certificate of Compliance***

A Certificate of Compliance (CoC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be safe.

The original CoC shall be submitted to the client's electrical representative/Engineer.

A copy of the CoC shall be included in the O&M Manual.

### ***Operating and Maintenance Manual***

One copy of the draft operating and maintenance manual and spare parts list shall be provided at an agreed date; in advance of the date of the start of the final testing and commissioning SATs, for acceptance by the Engineer. Three copies of the final editions shall be provided to the Engineer by an agreed date before successful completion of final testing and commissioning.

The Operating and Maintenance Manual shall be bound into a suite of hard-backed ring binders, and shall be provided with an index of all drawings pertinent to the Assembly. The index shall

include each drawing's origin, number, issue, status, and the Client's drawing number (where issued by the Engineer).

The Operating and Maintenance Manual shall include the following:

102. All design drawings and documentation relating to the Assembly; as delivered and tested.
103. General arrangement drawings.
104. Single Line Diagrams.
105. A schedule of all installed cables.
106. 'As installed and tested' records showing verification against stated design and installation criteria, including a schedule of all the final settings for all user adjustable equipment and components, and copies of all documentation presented and completed during the FATs, the SATs, and any other specified tests on completion.
107. Schedules of plant and equipment for each compartment/circuit; including a listing of the applicable standards, manufacturer, settings, type number, re-order code, etc., for each item of equipment and component included within the Assembly.
108. Manufacturers' contact details, technical information sheets for all items of equipment and components included within the Assembly. Manufacturers' catalogues may be provided subject to clear identification of the relevant components. All individual manufacturers' equipment/component test certificates and certificates of conformity, shall be included.
109. Inspection, testing, and maintenance recommendations, including detailed and specific operation, maintenance, and diagnostic data, and safe isolation information suitable for use by maintenance personnel, shall be provided for all equipment, components, and systems incorporated into the Assembly.
110. Schedule of spares provided with the Assembly, including manufacturer, description, part number, order code, and quantity.

The Operating and Maintenance Manual shall include detailed descriptions for use by the Client, on how the controlled plant and its management systems are intended to operate and be operated; under both manual and automatic control. Clear and detailed descriptions for each element of the Assembly shall be provided; and shall include system objectives, controlled plant start-up and shut down procedures, automatic control, manual intervention, primary and secondary control routines, plant selection including duty and standby options, local and remote selections, operational and safety constraints, status information, alarms and control interfaces with control systems, fault routines, etc.

The Operating and Maintenance Manual shall include 'as-installed and tested' information on both the hardware and software for each programmable device incorporated within the Assembly, including:

111. Overview of system operation in relation to the controlled plant.
112. System configuration.
113. Manufacturers' literature on operation, maintenance and testing of hardware and ancillaries, programming instructions, and diagnostics.
114. Hard copy program; with listings fully documented.
115. Listing of the final settings of all process dependent variables.
116. Permanent back-up copies, licensed in the name of the Client, shall be provided for all software, including operating programmes, application programs, and configuration

software for all configurable devices.

117. Any interconnecting leads, protocol conversion modules, connectors, etc. necessary to connect and communicate with each programmable / configurable device to a standard portable Notebook.

Manual format shall be A4 size on the filing side which shall be vertical with 20 mm margin for filing.

### ***Training***

General:

118. The LV switchgear and Control Gear training shall form part of the overall training programme.
119. The Contractor shall conduct training courses for designated personnel in the maintenance and operation of the Assemblies.
120. The Assemblies shall be in a complete working order before training shall commence.
121. A training schedule, together with the name and background of the person who will perform the training, shall be submitted to the Engineer for approval.
122. Training and training manuals shall be based on the O&M Manuals.
123. Training manuals shall be delivered for each trainee with two additional copies delivered for archival at the project site. The manuals shall include an agenda, defined objectives for each course.
124. Where the Contractor presents portions of the course material by audio-visuals, copies of those audio-visuals shall be delivered to the Employer as part of the printed training manuals.
125. The training shall include operator training and technical/maintenance training.
126. During the installation phase, a person will be designated by the Employer to be closely involved with the installation and commissioning process. The intention is not to interfere with the Contractors' installation team, but to do observation in order to obtain the maximum possible information regarding the installation, to enable efficient maintenance to be undertaken by the Employer after final hand-over and expiring of the guarantee period.

Operations & Maintenance training sessions

127. There shall be training sessions for the operation and maintenance of the Assemblies.
128. The program for the training shall include instruction for at least one day per Assembly (8 hours) instruction on-site.
129. The program shall at a minimum cover the following:
  - General system overview
  - Functional operation of the system i.e.:
    - System start-up and shut-down procedures
    - System access requirements
    - Alarms
    - Fault Finding
    - Backup Power Procedure
    - Incident Reporting

- Maintenance
  - Maintenance Schedule
  - Standard Maintenance Procedures
  - Spare Part Lists

Upon completion of the course, the operators should be fully proficient in the system operation and have no unanswered questions regarding the system.

## **SECTION D: PROJECT SPECIFIC LV ELECTRICAL WORKS TECHNICAL SPECIFICATIONS**

### **IMPORTANT NOTE:**

A Project Specific Specification (this section) takes precedence over a General Specification (PG 3 above). Should there be a conflict between a Project Specific Specification and a General Specification, the Project Specific Specification shall be used unless otherwise stated or instructed by the Engineer. For all specifications not covered under the Project Specific Specification (this section) the General Specification (PG 3 above) and applicable Regulations and Standards (PG 2 above) shall prevail.

### **WTW GENERAL**

#### ***Buildings Small Power & Lighting***

All installation works to be carried out or supervised by a qualified trade tested electrician who has written the exam for SANS 10142 and qualified with a wireman's license. Supervision shall mean full time.

The entire electrical installation shall be carried out in strict accordance with SANS 10142 part 1.

Only registered electrician with Department of Labour may issue a Certificate of Compliance.

ECA registration certificate to be provided to Engineer prior to installation works.

#### ***Tubing & Wiring***

All indoor and external tubing required for socket and appliance outlets and lighting shall be 20mm PVC conduit or as otherwise directed in the BoQ.

Conduit shall be installed after the Civil Contractor has fixed concrete reinforcing and prior to any concrete pour, where required.

The Contractor shall use the layout drawing as a guide only and shall establish the most suitable and shortest conduit routes on site and in liaison with the civil contractor where required.

No Surfex or flat twin exposed cabling shall be permitted. All wiring shall be installed in suitable wireways or conduit.

All conduit routes between DB and equipment shall have suitable draw wires installed to ensure ease of wiring.

All socket outlet and light switch boxes shall be flush with walls and installed prior to any plastering works.

All socket and appliance outlet wiring shall be 2.5mm<sup>2</sup> copper single core house wire RED, WHITE and BLUE in the case of 3-phase DBs. All neutrals shall be BLACK and earthing shall be GREEN of the same cross-sectional size as the phase conductors.

All lighting wiring shall be 1.5mm<sup>2</sup> copper single core house wire RED, WHITE and BLUE in the case of 3-phase DBs. All neutrals shall be BLACK and earthing shall be GREEN of the same cross-sectional size as the phase conductors.

#### ***Socket & Appliance Outlets***



All socket outlets shall be double switched 16A CBi or **SANS** approved equivalent.  
 Socket outlets shall be installed 500mm above floor height or as otherwise directed on the layout drawings.

**Building Lighting**

The following luminaires shall be supplied and installed for the various buildings:

Item	Rooms	Type	Specification
1	All Internal Rooms	LED Strip Luminaire	LED CRI>80 4000K <b>Min 4800Lm</b> Complete with LED driver & mounting brackets BEKA Vapourline VLN LED Standard version <b>or equivalent</b> to Engineers approval and compliant with specification
2	Chlorine Storage & Chlorine Vacuum Rooms	Vapour Proof LED Strip Luminaire	<b>ATEX Zone 1 classification</b> , vapour proof with stainless steel clips and brackets LED CRI>80 4000K <b>Min 4000Lm</b> Complete with LED driver & mounting brackets
3	Outdoor walls	LED Bulkhead	LED <b>Min 5800Lm</b> IP65 rating CRI>70 4000K Complete with LED driver BEKANOVA LED <b>or equivalent</b> to Engineers approval and compliant with specification

All light switches shall be single pole single throw CBi or **SANS** approved equivalent.  
 For the Chlorine Storage and Chlorine Vacuum Rooms, suitable IP65 protected light switches shall be installed on the outside of such rooms.

All outdoor lighting circuits shall be wired back to a PEC:

130. Make: Royce Thompson 1000SA

131. Operating voltage: 230  $\pm$ 10%, 50Hz
132. Switching cycles: Minimum of 15 000 and zero crossover voltage with load rating of 1800VA
133. Operating temperature: -20° / +80°
134. Warranty: 3 years with clear UV protected dome
135. Surge Protection: 320 Joule metal oxide varistor
136. Ingress Protection: IP65

The PEC shall be installed in a suitable IP65 enclosure with a glass/polycarbonate window.

### ***Power & Instrumentation Cable Racking***

The cables between the MCC panel and each pump motor or other unit shall be installed on a suitable cable rack comprising of either cable tray or mesh basket to the Engineers approval. Only hot dipped galvanised cable racking including all associated joints, bends, elbows, connectors etc. shall be accepted.

Cable racking shall be minimum 150mm or 300mm wide trays as specified in the BoQ per applicable MCC or pump room. The Contractor may opt to use wider trays but shall adjust the rates accordingly to accommodate such trays at no additional expense.

Cables to the motors shall exit the MCC from the top gland plate for ceiling mount cable racking systems.

The Civil Contractor shall break out sections of a wall to allow for the cable rack to pass through the wall, where required.

The rack shall be suspended from existing ceiling or roof trusses and correctly secured using appropriate fasteners.

Drop down sections shall allow for the termination of the power and instrumentation cables to each pump section/motor, E/S/transducer.

The cable rack shall be correctly earthed at each end and between all splices and sections using a minimum 10mm<sup>2</sup> copper earth core.

### ***Building Security System (where specified in the BoQ)***

The Electrical Contractor shall outsource the complete supply and installation for an alarm system for the buildings where specified in the BoQ.

All Zones shall be wired back to a monitoring panel with audible alarming.

The alarm system shall include:

137. Alarm unit
138. Power Supply Unit
139. Keypads mounted at main entrance door
140. Passives for each room
141. Door sensor
142. LED status at the entrance door
143. Communication module for linking back to a security company
144. All tubing, trunking and wiring

The alarm systems shall be commissioned by a specialist alarm security sub-contractor.

Remote monitoring and response by a local security company is not required at this stage.  
A common alarm signal shall be wired back to the PLC for SMS notification to operating personnel.

### ***Building Air-Conditioning***

The following air-conditioning units shall be installed in the substation:

- 145. Supervisors Office: 18000btu
- 146. Control Room: 18000btu
- 147. Laboratory: 18000btu

Air-conditioners shall be of the split inverter type.

Units shall be stainless steel with bluchem treatment.

The units shall be electrically connected to dedicated isolators

### ***Building Lightning Protection***

The Contractor shall supply and install suitable Lightning Protection for the WTW building.

Such supply and installation shall be outsourced to either Messrs SME Lightning Protection and Earthing or Messrs Pontins Natal.

The design of the lightning protection shall be forwarded to the Engineer for final approval.

## **WTW PUMP ROOM: MCC-1**

### ***MCC Accommodation***

The MCC shall be suitably designed to be accommodated in the pump room.

The MCC shall sit flush with the floor slab and up against the wall. Therefore, back opening access doors are not permitted. Access to all equipment including busbars and cabling shall be from the front, top and bottom.

### ***MCC Layout***

Refer to Drawing 316WS-E.01.

The MCC shall consist of the following panel/compartments sections:

- 148. Incomer: Mains supply incl. surge arrestors and metering
- 149. Backwash pump 1: 11kW VFD
- 150. Backwash pump 2: 11kW VFD
- 151. Air-blower 1: 18kW soft starter
- 152. Air-blower 2: 18kW soft starter
- 153. Domestic water pump 1: 1.1kW DoL
- 154. Domestic water pump 2: 1.1kW DoL
- 155. Dosing pump 1: 0.75kW DoL
- 156. Dosing pump 2: 0.75kW DoL

- 157. Transfer pump 1: 0.75kW DoL
- 158. Transfer pump 2: 0.75kW DoL
- 159. Motive water pump 1: 0.75kW DoL
- 160. Motive water pump 2: 0.75kW DoL
- 161. DB-1: Filter gallery DB
- 162. DB-2: Outdoor kiosk 1
- 163. PLC/Telemetry section

The MCC shall be free standing and shall have measurements that do not exceed the available space as highlighted above.

The lighting within the enclosure shall be suitably sized LED lighting to provide sufficient lighting throughout the enclosure and all compartments.

The MCC shall be designed to accommodate the mains supply, motor starters, local and PLC section. Each section shall be separated by mechanical barriers (steel cover plates), which allows for only the insulated common busbars to extend through to each power section including the earth bar which shall extend through the entire width of the MCC. No cabling to be installed between the sections.

All cable terminations shall be both bottom and top entry.

The MCC shall be powder coated ELECTRIC ORANGE.

The MCC shall be designed with the correct ventilation and forced cooling for the motor starters where required.

The switchboard manufacturer shall allow for terminal blocks for easy terminations.

The MCC shall be supplied with a suitable cable glanding plate for each section that can be removed to allow for drilling and glanding.

### ***Switchgear & Protection***

All switchgear (isolators, MCCBs, MCBs etc.) used throughout the Switchboard shall be either **Schneider Electric, ABB, Siemens or CBi LV**. No other make or brand shall be accepted.

Switchgear shall be consistent throughout the Switchboard and shall consist of only one brand as specified above.

MCCBs shall be fitted with electronic adjustable trip units.

All switchgear, busbars and associated equipment shall be suitably rated for the following fault levels:

- |   |              |       |
|---|--------------|-------|
| 164. 400V Mains Supply from Miniature Substation: | 3-Phase:     | 10 kA |
|   | Phase-Earth: | 10 kA |

Each motor starter section shall be equipped with suitably sized isolators or fuses. It is expected that VFD units shall incorporate suitable motor protection features.

All motors/pumps shall be equipped with remote emergency stops located at each motor and wired/cabled back to each starter for E/S purposes. The Contractor shall make an allowance for new 2.5mm<sup>2</sup> 2-core PVC SWA cable for such purposes, including E/S switches and Unistrut for mounting.

### ***Metering & Panel Instrumentation***

For the main incomer, a Schneider Electric PowerLogic PM5100 - 3Ph Power Meter shall be installed after the Mains Supply isolator.

All panel wiring between CTs, busbars, switchgear and metering shall be minimum 2.5mm<sup>2</sup> cu 1-core PVC panel wire - GREY. House wire shall **NOT** be accepted.

All metering panel wiring shall be suitably numbered and approved by the Engineer prior to installation.

Each Motor Starter section shall include the following minimum panel instrumentation irrespective if such instrumentation forms part of the VFD unit:

165. Schneider Electric PowerLogic PM5100 - 3Ph Power Meter
166. Run Hour Meter (signal from VFD)
167. Alarm and operating status lamps
168. Auto/Manual selection
169. Emergency Stop

### ***Motor Starters***

The MCC shall supply 2 x 11kW Backwash Pumps.

The Backwash Pump Starters shall be of the type VFD: Variable Frequency Drive.

The MCC shall supply 2 x 18kW Air-Blowers.

The Air-Blower Starters shall be of the type SOFT STARTER.

All other motors/pumps shall be a standard direct on-line starter.

VFD and SOFT STARTERS shall comply with the minimum general requirements in Particular Project Specification PG3 above.

VFDs and SOFT STARTERS shall be either Schneider Electric, Allen Bradley, ABB, Siemens or WEG. No other make or brand shall be accepted.

The MCC manufacturer in consultation with the drive manufacturer/supplier; shall specify an acceptable VFD model suitable and sized for the pump motors. This shall be approved by the Engineer prior to any orders being placed with the respective supplier.

A copy of the pump specifications will be made available for the MCC manufacturer.

Each motor starter shall be supplied with electronic protection or form an integral part of the VFD.

Each motor starter compartment shall be supplied with the correct cooling for the drives which shall form part of the MCC.

Each motor starter shall be equipped with an emergency stop including provision for a remote emergency stop located at the pump.

Each motor starter shall be suitably rated for the application.

The motor starters shall communicate with a suitable PLC to be installed in the PLC section of the MCC.

All required auxiliary supplies AC and/or DC including PSUs etc shall be supplied complete with the VFDs for incorporation into the MCC. This shall include all communication modules and cabling between drives and the PLC.

### ***PLC***

The MCC shall be supplied with a suitable PLC that shall control and monitor the Starters and other instrumentation equipment and monitoring devices.

The PLC shall be preferably the same make as the VFDs.

The PLC shall be installed in a separate compartment within the MCC and shall be supplied complete with CPU, PSU, input/output modules, rack, comms modules, a UPS and communication equipment to send status and alarms back to the SCADA system.

A suitable UPS shall be supplied as part of the PLC to ensure uninterrupted supply to the PLC and instrumentation during mains supply failure, minimum 1 hour.

The PLC compartment shall also be equipped with an HMI screen mounted on the front panel, which shall provide a graphical display of the pump station including operating and status parameters.

The PLC shall also be supplied with all OEM software including communication cables where required. The software shall be supplied to the Client at no additional cost.

## **PLC CONTROL & INSTRUMENTATION**

### ***General***

The PLC as specified in the MCC specifications above shall monitor and control the motor starters, pumping duties, pumping speed, water levels, mains supply failure, etc. for each pump station and any other parameter that may be required.

The Contractor shall sub-contract the total programming and commissioning of all PLC monitoring and control to a specialist System Integrator who has experience on such PLC and VFD equipment.

The System Integrator shall liaise with the Engineer and all other specialists to obtain a full methodology for all monitoring and control for the pump station.

The Contractors rates for the PLC and instrumentation engineering shall include for all travel and accommodation for the system integrator.

### ***Basic PLC Control Features***

As a basic minimum, the PLC shall monitor and control the pump stations as directed below. However, such features and parameters will be confirmed with the Client during commissioning:

#### **Pump Duty:**

170. At any point in time, the duty shall be 1 pump in operation with 1 on standby (rest).
171. The duty shall be shared between both pumps.
172. The anticipated run time per duty shall be 18 hours (to be confirmed/changed during commissioning). After 18 hours run time, the operational pump shall ramp down to rest and the other unit in rest shall ramp up to the current operating speed.
173. After power outages, the duty shall be reset and a new duty cycle started.
174. It is imperative that the PLC be programmed to prohibit both motor starters from operating simultaneously due to supply side constraints.

#### **Pumping Flow Rate**

175. To be determined by mechanical engineer if required.

#### **Level Control (Clearwater reservoir)**

176. The water level at the clearwater reservoir shall be monitored.
177. Should the clearwater reservoir reach a specific volume, the PLC shall send a command signal to the MCC PLC to stop pumping.
178. Pressure sensor to be installed in clearwater reservoir to be able to monitor depth of water

within the reservoir.

#### Alarms & Status

179. The PLC shall monitor all starter alarms and operating parameters.

180. Alarms and status shall be communicated to the SCADA system.

181. Alarms and status shall also be shown on the front HMI panel.

#### Remote Control

182. Reservoir levels

### ***Transducers & Control Instrumentation***

The Contractor shall supply, install and commission all transducers, cabling and other instrumentation.

Transducers shall be cabled back to the PLC for monitoring and control purposes.

The make and type of transducer shall be approved by the Engineer prior to any order being placed.

The Contractor shall supply all such transducers including cabling and termination to the PLC.

### **SCADA & TELEMETRY**

#### ***Basic Telemetry***

The Contractor shall employ the services of the System Integrator to design and implement a telemetry and SCADA system that monitors and controls the WTW processes.

The PLC in the MCC shall communicate back to the central SCADA system to be housed in the Control Room.

The SCADA system shall be housed in the control room together with the telemetry/PLC field interface unit.

The telemetry/PLC field interface unit shall communicate to the PLC via a standard industrial protocol that is locally supported.

Communication shall be fibre optic. The supplier shall recommend the most suitable communication system for the entire application.

Fibre optic cables, if recommended, shall be installed in the same trench as the power cables where applicable.

#### ***SCADA System***

The Contractor shall supply and install a basic SCADA system that will monitor and report on all MCC status and alarm conditions for both WTW including future requirements for the entire WTW.

The SCADA system shall be **Adroit**.

The Adroit system shall be supplied with sufficient scanned points for inputs and future control outputs. The Contractor shall liaise with the PLC System Integrator to determine the required scan points for quoting purposes.

The Adroit SCADA shall be supplied together with a suitable high-end desktop PC including 24" HD monitor, keyboard, mouse, latest Windows operating system and a 1-hour backup UPS.

In addition to the above equipment, the Adroit SCADA system shall be supplied with a GSM modem to send SMS alarms to off-site operators/personnel. The GSM modem shall be supplied with SIM card loaded with sufficient data for commissioning purposes.

The Adroit system shall be configured with a basic overview mimic/s of the entire WTW showing MCC status, pumping status, levels and alarms.

Alarms shall be configured to send SMSs.

The Contractor shall sub-contract the services of a suitable SCADA and telemetry/PLC specialist system integrator to commission the entire Telemetry/PLC and SCADA system.

The Contractors rates for the Telemetry and SCADA system shall include for all travel and accommodation for the System Integrator/s.

Training shall be allowed for the Operators.

As part of the SCADA system, the Contractor shall supply a suitable office desk and chair for the SCADA PC and equipment.

## LOW VOLTAGE CABLE RETICULATION AND SUPPLY

### ***Eskom Mains Supply: Metering Kiosk 1***

The Contractor shall contact Eskom to ascertain the existing supply point at the Pole Mounted Transformer located due south of the WTW.

The required supply for the entire works is **125A @ 400V**.

If required, a new 50mm<sup>2</sup> cu 4-core PVC/SWA/PVC cable shall be installed from the Eskom Metering point at the PMT to the new Metering Kiosk to be installed just on the inside of the WTW fence line as shown on Drawing **316WS-E.02**.

Refer to **Drawing 316WS-E.01**.

The Contractor shall supply and install a new **Metering Kiosk 1**.

The Metering Kiosk 1 shall be manufactured by the **same Switchboard Manufacturer** who shall supply MCC-1.

The Kiosk shall be free standing with an IP65 rating.

The Kiosk shall be designed to accommodate the required metering.

All cable terminations shall be bottom entry.

The kiosk shall be powder coated Electric Orange.

The switchboard manufacturer shall allow for terminal blocks or busbar droppers for easy cable terminations.

The Kiosk shall be supplied with a suitable cable glanding plate that can be removed to allow for drilling and glanding.

This outdoor kiosk shall have a minimum rating of IP65.

The kiosk shall have both back and front access doors.

### ***Cable Reticulation***

The following cables shall be supplied and installed:

From	To	Length	Cable Size	ECC Size
Eskom PMT	Metering Kiosk 1	TBD	50mm <sup>2</sup> cu 4-core PVC SWA PVC	35mm <sup>2</sup> BCEW
Metering Kiosk 1	MCC-1	+/- 70m	50mm <sup>2</sup> cu 4-core PVC SWA PVC	35mm <sup>2</sup> BCEW
MCC-1	DB-1	+/- 35m	16mm <sup>2</sup> cu 4-core PVC SWA PVC	Integral ECC
MCC-1	DB-2 (outdoor	+/- 30m	10mm <sup>2</sup> cu 4-core PVC SWA PVC	Integral ECC



	Kiosk)			
DB-2	DB-3 (guard house)	+/- 65m	10mm <sup>2</sup> cu 2-core PVC SWA PVC	Integral ECC
DB-2	Lighting	+/- 120m	6mm <sup>2</sup> cu 4-core PVC SWA PVC	Integral ECC

***Cable Reticulation – Pump Motors***

All new cables shall be supplied and installed with the relevant ECCs.

The cables to be supplied and installed between each Motor Starter and motor shall be:

From	To	Cable Size	ECC Size
MCC-1	11kW Pumps	6mm <sup>2</sup> cu 4-core PVC SWA PVC	6mm <sup>2</sup> BCEW
	18kW Pumps	10mm <sup>2</sup> cu 4-core PVC SWA PVC	10mm <sup>2</sup> BCEW
	DoL Pumps	2.5mm <sup>2</sup> cu 4-core PVC SWA PVC	Integral ECC

Where cable trenches are not possible, suitable cable racking on cable trays or mesh shall be used (refer to Particular Project Specification PG 4.1.5).

Cable routes shall be accurately measured on site before any cable is cut from the cable drum.

Cables shall be cut to correct length to ensure that there are no joints required.

All cables shall be terminated using the correct glands and lugs suitably sized for the cable size.

Each power cable shall be installed together with a separate earth continuity conductor with the exception of the cables specified with integral ECCs.

The earth continuity cable shall be buried alongside the power cable and shall be terminated onto the respective earth bars in switchboards and MCCs

**AREA LIGHTING**

***Area Flood Lighting***

Refer to Drawing No. 316WS-E.02.

A total of 3 flood light masts shall be supplied and installed with flood light luminaires.

The flood lighting shall be installed on 12m mounting height stepped hot dipped galvanised steel poles complete with mounting brackets for the flood light luminaires.

The flood lighting poles shall be designed by a reputable street/high mast lighting pole manufacturer who can provide a mechanical engineers certificate for the structural integrity of the pole that it will be safe for use when installed with the luminaires.

The poles shall be fabricated from mild steel with 3 stepped sections consisting of the following minimum sections and sizes:

- 183. Step D1: 3m x 150mm OD
- 184. Step D2: 6m x 114mm OD
- 185. Step D3: 3m x 76mm OD

The poles shall be fabricated with base plates including gussets suitable for the pole to be mounted onto a steel reinforced concrete base.

Cable termination access compartments shall be provided at least 750mm from ground level for the termination of supply cables.

The access compartments shall be equipped with din rail for the installation of a 6A MCB and an earthing point.

The pole manufacturer shall supply a design for the concrete mounting base and the Electrical Contractor shall construct the base as per design including the supply of all materials and labour for the base.

The concrete base shall accommodate a 50mm PVC long radius duct for cable entry into the base of the pole.

Hold down bolts shall be stainless steel bolts.

The hold down bolt cage shall be directly earthed using 2 x 70mm<sup>2</sup> bare copper earthing straps protruding from within the concrete base and connected to a crow's foot earth grid comprising of 3 x 1.5m earth electrodes.

Each pole shall be equipped with a suitable galvanised luminaire bracket suitable to support the weight of the LED luminaires.

Each access compartment shall be fitted with a 6A MCB.

The Contractor shall dress the pole complete with luminaires and 1.5mm<sup>2</sup> copper 3-core cabtyre cable between luminaires and MCB.

A total of 2 x LED flood light luminaires shall be supplied and installed on each pole based on the following minimum specifications:

No.	Specification	Luminaire
1	Type	LED
2	Nominal flux minimum	22000Lm
3	Colour temperature	4000K
4	Rating	150 - 200W
5	Surge protection	Min 4kV
6	Ingress protection	IP65
7	Optic	Glass
8	Body	Aluminium
9	Mounting stirrup	Galvanised/Stainless Steel
10	NEMA socket	Blank (no PEC required)
11	Preferred Luminaire	BEKA Schröder OMNIflood <b>or equivalent</b> to Engineers approval and compliant with specification

### ***Street Lighting***

Refer to Drawing No. 316WS-E.02.

Street lights shall be installed on minimum 4.7m total length with a maximum 4m mounting height hot dipped galvanised steel street light poles consisting of at least two stepped sections of 114mm and 76mm OD. A mechanical engineer's certificate shall be provided with the design of the poles.

The poles shall be provided with 2 cable access points within the buried section of the pole.

Cable termination access compartments shall be provided at least 750mm from ground level for the termination of supply cables.

The access compartments shall be equipped with din rail for the installation of a 6A MCB and an earthing point.

The poles shall be installed directly into the ground.

Luminaires shall be bottom entry and installed directly onto the poles without any spigot or bracket.

Each access compartment shall be fitted with a 6A MCB.

The Contractor shall dress the pole complete with luminaire and 1.5mm<sup>2</sup> copper 3-core cable between luminaire and MCB.

Luminaire specifications:

No.	Description	Min specification
1	Type	LED
2	Nominal flux minimum	3000Lm
3	Colour temperature	Min 4000K
4	Maximum Supply	30W
5	Surge protection	Min 4kV
6	Ingress protection	IP65
7	Optic	Glass
8	Body	Aluminium
9	NEMA socket	Blank (no PEC required)
10	Preferred Luminaire	BEKA Schröder LEDLume Mini 8/29 with 5112 optic <b>or equivalent</b> to Engineers approval and compliant with specification

### **Lighting Control**

Refer to Drawing 316WS-E.01.

The Contractor shall supply and install a new **Outdoor Kiosk 1**.

The Outdoor Kiosk shall be manufactured by the same Switchboard Manufacturer who shall supply MCC-1.

The Kiosk shall be free standing.

The Kiosk shall be designed to accommodate all switchgear and control systems.

All cable terminations shall be bottom entry.

The kiosk shall be powder coated the same colour as the existing kiosk which is a light grey.

The switchboard manufacturer shall allow for terminal blocks for easy cable terminations.

The Kiosk shall be supplied with a suitable cable glanding plate that can be removed to allow for drilling and glanding.

This outdoor lighting kiosk shall have a minimum rating of IP65.

Minimum PEC specifications:

186. Make: Royce Thompson 1000SA

187. Operating voltage: 230 ±10%, 50Hz

188. Switching cycles: Minimum of 15 000 and zero crossover voltage with load rating of 1800VA

- 189. Operating temperature: -20° / +80°
- 190. Warranty: 3 years with clear UV protected dome
- 191. Surge Protection: 320 Joule metal oxide varistor
- 192. Ingress Protection: IP65

The PEC shall be installed within the kiosk with a small glass window that conforms with the IP65 rating.

### ***Lighting Circuits***

All area flood lights and street lights shall be connected as per Drawing No. 316WS-E.02.

The Contractor shall supply and install 6mm<sup>2</sup> cu 4-core PVC SWA + ECC and 4mm<sup>2</sup> cu 2-core PVC SWA + ECC cable for all lighting circuits.

The cables shall be terminated into each pole using Pratley No. 2 end connectors supplied with insulating shrouds.

### **MAINS SUPPLY: ESKOM APPLICATION**

The Contractor shall make contact with Eskom to determine the existing supply size.

The required supply for this installation shall be **125A @ 400V**.

The Contractor shall apply for the necessary upgrade to the new WTW on behalf of the Client.

A provision for this application shall be provided for in the BoQ as a Provisional Sum to be approved by the Engineer.

## P) COLOUR CODING FOR PIPELINES, PLANT AND EQUIPMENT

### SCOPE

The purpose of the colour code is to standardise the usage of colours used within the works.

### COLOUR CODES – SABS 1091/1092

The colours for identification colour marking of pipelines and equipment shall be as indicated below:

Colour	Code
Arctic Blue	F28
Black	GH19
Brilliant Green	H10
Canary Yellow	C61
Cornflower	F29
Crimson	A03
Emerald Green	E14
Golden Brown	B13
Golden Yellow	B49
Jacaranda	F18
Light Orange	B26
Light Stone	C37
Middle Brown	B07
Pastel Grey	G54
Primrose	C67
Salmon Pink	A40
Signal Red	A11
Verdigris Green	E22
White	HG100

### SPECIFIC USE OF COLOURS

#### Labelling, Numbering of Plant, Equipment and Buildings

Room Numbers	White on Black Background
Electrical Circuits	Black on White Background
Plant Equipment Stock Numbers	Black on Yellow Background
Room Size	White on Cornflower (sky blue) Background
Distribution Board ID	Black on Yellow Background
Danger Signs	Signal Red on White Background
Information Signs	White on Emerald Green Background

**Pipelines**

<b>Contents of Pipe</b>	<b>Basic Colour</b>	<b>Identification Band (150mm Wide)</b>	<b>Wording</b>
<b><u>Water</u></b>			
Potable - cold	Brilliant Green	Cornflower	
Potable – hot	Brilliant Green	Crimson	
Raw	Brilliant Green		RAW
Sludge – all	Brilliant Green		SLUDGE
Supernatant Return (from Sludge)	Brilliant Green	Pastel Grey	
<b><u>Waste Water</u></b>			
Raw Sewage	Middle Brown	Black	
Raw Sludge	Middle Brown	Golden Brown	
Humus Sludge	Middle Brown	Jacaranda	
Treated Sludge	Middle Brown	White	
Returned Sludge	Middle Brown	Crimson	
Supernatant Liquor	Middle Brown	Arctic Blue	
Final Effluent	Middle Brown	Brilliant Green	
<b><u>Chemical Solutions</u></b>			
Alum	Jacaranda	Arctic Blue	
Bentonite	Jacaranda		BENTONITE
Caustic Soda	Jacaranda	Black	
Copper Sulphate	Jacaranda	Light Stone	
Activated Carbon	Jacaranda	Pastel Grey	
Lime	Jacaranda	Crimson	
Polyelectrolyte	Jacaranda	Verdigris Green	
Soda Ash	Jacaranda		SODA ASH
Sulphuric Acid	Jacaranda	White	
Chlorine	Jacaranda	Canary Yellow	
Ferric Chloride	Jacaranda	Brilliant Green	
Sodium Hypochloride	Jacaranda	Canary Yellow	
Sodium Chloride	Jacaranda	Canary Yellow – Brilliant Green	
Chloride of Lime	Jacaranda	Canary Yellow – Crimson	
<b><u>Gases</u></b>			
Chlorine	Light Stone	Canary Yellow	
Ammonia	Light Stone	Signal Red	
Ozone	Light Stone		OZONE
Chlorine Dioxide	Light Stone	Canary Yellow – Crimson	
Methane	Light Stone	Black	

Contents of Pipe	Basic Colour	Identification Band (150mm Wide)	Wording
<b><u>Fuel and Oil</u></b>			
Diesel	Golden Brown	White	
Petrol	Golden Brown	Signal Red	
Hydraulic Oil	Golden Brown	Salmon Pink	
Waste	Golden Brown	Black	
<b><u>Air</u></b>			
Blowers	Arctic Blue	Signal Red	
Compressed	Arctic Blue		
Instrument	Arctic Blue	Salmon Pink	
Vacuum	Arctic Blue	Primrose	

Where it is impractical to paint the whole pipeline the basic pipeline colour is to be painted in two 150mm wide bands on either side of the identification bands. Where there is no identification band but wording is specified, the specified wording shall be stencilled on the pipe, in the largest practicable lettering up to a maximum of 75mm in height, in clearly visible locations on either side of all fittings.

### Plant and Equipment

Items of Equipment	Basic Colour
<b><u>Pumps</u></b>	According to pipe contents
<b><u>Valves</u></b> (Anti-clockwise opening valves) Body Bonnet, yoke and hand wheel or cap	According to pipe contents Brilliant Green
<b><u>Valves</u></b> (Clockwise opening valves) Body Bonnet, yoke and hand wheel or cap	According to pipe contents Signal Red
<b><u>Electrical Switchgear</u></b> (other than starting and stopping devices and emergency stop controls)	Light Orange
Exposed moving or rotating machine parts	Light Orange
Cable and conduits	Light Orange
Starting devices	Emerald Green
Stopping devices	Signal Red
Emergency stop controls	Signal Red
Telemetry	Natural Colour
Fire protection equipment	Signal Red
Safety equipment	Emerald Green
Handrails	Golden Yellow
Handrail Stanchions	Black
Crawl Beams	Golden Yellow (50mm black diagonal lines optional)

Demarcation of walkways	Golden Yellow
Housekeeping Markings	Golden Yellow

## DEMARCATION OF “KEEP CLEAR” AREAS

### Refuse Bin Locations

All refuse bin locations shall be demarcated in the following manner:

The position where the “BIN” is to stand shall be indicated by a Golden Yellow (B49) circle (100mm greater than the diameter of the base of the bin) painted on the floor with the word “BIN” stencilled in black across the centre of the circle.

A 190mm x 190mm “Keep Area Clean” symbolic sign shall be affixed to the wall or other fixture next to the refuse bin to indicate its use as a refuse bin and not as a scrap (metal) bin.

### Fire extinguishers, fire hose reels, electrical distribution boards and other “Keep Clear” areas

The equipment shall have a “keep clear” area demarcated on the floor below its immediate position. The demarcation shall be symmetrically 300mm greater than the maximum width of the equipment and extend 500mm from the supporting wall or fixture. An eighty millimetre wide black line, within the demarcated area shall be painted as a border to the demarcation. The remaining inner area shall be painted Golden Yellow and the words “KEEP CLEAR” and/or “UNGABEKI” stencilled in the yellow block. The lettering shall be 50mm high where possible.

On expanded mesh or similar perforated floor areas a solid metal plate shall be placed below the equipment on which the demarcation shall be painted.



## **Q) DEMOLITION OF EXISTING STRUCTURES**

### **PREAMBLE**

Notes to contractors:

Site clearance: The item given in the Bill of Quantities for site clearance shall be deemed to include the removal from the site, or burning if permitted by the Local Authority, of shrubs and trees with trunks under 200mm girth measured at 1m above ground level, hedges, bushes, other vegetation, rubbish, and debris. Holes left by roots are to be backfilled with earth and rammed.

Refer to SANS 10400 parts E and F pertaining to:

193. 1 – demolition,
194. 2 – making sure basements are safe during and after demolition if applicable,
195. 3 – prohibition of dangerous methods of demolition.

### **DEMOLITION OF BUILDINGS**

Permission shall be required from the relevant local authority before demolition can commence.

The Contractor is referred to the preambles for “Alterations” insofar as they apply and the following:

The demolition of existing buildings is to be done in a practical and safe manner, under the continuous supervision of a competent Foreman.

Rates for the demolition of existing buildings are to include for breaking up and removing of all external screen walls, steps and ramps, surface water channels, rainwater sumps, gulleys, etc. and grubbing up and removing all foundation walls and footings, disconnecting and removing all services to a point not less than 1m beyond the perimeter of the buildings, plugging off ends of all remaining pipes, and for filling in all holes with clean earth and ramming up to ground level.

All movable fittings and furniture, fire extinguishers and electrical and other equipment in the buildings to be demolished are to remain the property of the Client and are to be removed by the Contractor prior to the commencement of the demolition.

Before commencing the demolitions, the Contractor shall comply with any Local Authority regulations in force in respect of rodent extermination, etc. and he shall obtain the required Clearance Certificate. Items to cover the cost of obtaining the certificate and the fumigation, etc. of the buildings to be demolished, if required, are to be provided elsewhere in the Bills of Quantities, and the fumigation is to be carried out by a firm specialising in this type of work.

The fumigation of the buildings to be demolished shall only be carried out if called for by the Local Authorities.

After handing over the site to the Contractor, the risk of any loss or damage to the buildings to be demolished and the materials therein, caused by theft, vandalism, etc. shall be the responsibility of the Contractor and he shall take such precautions as he deems necessary against such loss or damage.

### **SITE SAFETY**

Site operations must be carried out in a safe, responsible manner.

Refer to SANS 10400-part F regarding:  
environmental conditions,  
geotechnical conditions  
site preparation,  
soil poisoning,  
control of noise and dust on site,  
demolition work,  
waste materials on building sites,  
cleaning of sites,  
sanitary facilities, and  
builders' sheds.

## **ASBESTOS REGULATIONS 2001**

In terms of Asbestos Regulations 2001, no individual person, contractor, or agent shall remove, demolish, or strip any building containing asbestos or products containing asbestos (including asbestos roof sheeting, ceilings, guttering and down pipes) unless the work is performed by a "Registered Contractor", registered with the Department of Labour.

All asbestos work shall be carried out under the supervision of an "Approved Inspection Authority".

It is a requirement that before any work involving asbestos removal is carried out, the following procedure and documentation is followed:

1. Prior to the commencement of any demolition work, written notification shall be given to the Assistant Manager (Inspection and Enforcement), Durban Labour Centre, Masonic Grove, Durban, stating the name, address, and details of the person(s) removing or stripping the asbestos. The notification shall include the date, time, and place where the proposed work is to be carried out. (Regulation 3).
2. The name and details of the Approved Inspection Authority that is to supervise and confirm that the work is being carried out according to the specific requirements of the Asbestos Regulations 2001 (as amended), including the approved "written work procedure" document. This document shall be submitted and signed at least 14 days prior to commencement of demolition work by the Approved Inspection Authority. (Regulation 21).
3. The production of valid accreditation certification of training for all employees involved in the asbestos removal work.
4. On completion of the asbestos related work a "Clearance Certificate" which includes the asbestos disposal certificate shall be forwarded to the Department by the Approved Inspection Authority.

In terms of the above regulations, it is an offence to carry out any asbestos work as defined in the above regulations without the necessary approval / requirements being met. Individual persons or contractors found to contravene these regulations will be issued with a Prohibition Notice which in effect will stop all work on site and the offenders will then be liable for prosecution.

## **NOTICE OF DISCONNECTIONS**

The Contractor is to give ample notice to the Client regarding any disconnections necessary prior to the removal or interruption of electrical or telephone cables, water supply and sanitary services, etc.

## **DUST**

The Contractor is to allow in his rates for taking all precautions necessary to prevent any nuisance from dust whilst carrying out the works.

## **SHORING**

Rates for shoring are to include for the use and waste of all props, needles, wedges, braces, nails and screws, etc. required and for all cutting, notching, framing and fitting, maintaining in position for the required periods and removing at completion. All shoring is to be executed in an approved manner.

### **MATCHING EXISTING WORK**

The terms “make good” or “making good” to existing work as described in the items shall mean making good with materials to match, all joined to existing.

### **REMOVAL**

Remove all indicated structures et al. as indicated on drawings which are not deemed fit for re-use, and discard of at an approved dumping site.

The Contractor is to confirm and identify, in collaboration with the Client, material and fittings deemed fit for re-use and indicate an area for removal and storage for re-use by the Client

**PROJECT SPECIFIC OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION**

**FOR**

**CREIGHTON WATER SUPPLY SCHEME**

**CONTRACT No. HGDM 821/HGDM/2022**

**UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY.**

**MANAGED ON BEHALF OF**



**HARRY GWALA DISTRICT MUNICIPALITY  
(THE “CLIENT”)**

**KEY ROLE PLAYERS**

**CLIENT**

Principal Agent:

Civil Engineer

Quantity Surveyor

Land Surveyor

Mechanical Engineer

Environmental Control Officer

Health and Safety Agent

**PRINCIPAL CONTRACTOR**

Contracts Manager

Site Agent

H&S Officer

Other:

## TABLE OF CONTENTS

1.	LIST OF ABBREVIATIONS .....	164
2.	DEFINITIONS .....	165
3.	KEY REFERENCES .....	166
4.	INTRODUCTION .....	166
4.1	<b>Purpose of the Project Specific Health and Safety Specification (PSHSS)</b> .....	166
4.2	<b>Implementation of the Project Specific Occupational Health and Safety Specifications (PSHSS)</b> .....	167
4.3	<b>Requirements at Tender Stage</b> .....	167
5.	GENERAL REQUIREMENTS .....	168
5.1	<b>Summary of Risks identified during Design</b> .....	168
5.2	<b>Specified Hazardous Chemical Substances</b> .....	168
6.	OCCUPATIONAL HEALTH & SAFETY MANAGEMENT .....	169
6.1	<b>Structure and Organization of H&amp;S Responsibilities</b> .....	169
6.1.1	<b>Notification of Commencement of Construction Work</b> .....	169
6.1.3	<b>Appointment of Competent Site Personnel</b> .....	170
6.1.4	<b>Construction Supervision</b> .....	170
6.1.5	<b>Construction Health and Safety Officer</b> .....	170
6.1.6	<b>Traffic Safety</b> .....	171
6.1.7	<b>Health and Safety Representatives and H&amp;S meetings</b> .....	171
6.1.8	<b>Appointment of Competent Contractors</b> .....	172
7.	GENERAL RISK MANAGEMENT .....	172
7.1	<b>Health Risks and Medical Surveillance</b> .....	172
7.2	<b>Noise Risks</b> .....	173
7.3	<b>Emergency Procedures</b> .....	173
7.4	<b>First Aiders and First Aid Equipment</b> .....	173
7.5	<b>Fires and Emergency Management</b> .....	174
7.6	<b>Incident Management and Compensation Claims</b> .....	174
7.7	<b>Personal Protective Equipment (PPE) and Clothing</b> .....	174
7.8	<b>Occupational Health and Safety Signage</b> .....	174
7.9	<b>Induction of Employees and Visitors, General H&amp;S Training</b> .....	175
7.10	<b>Management of Plant and Equipment</b> .....	175
7.11	<b>Excavations</b> .....	175
7.12	<b>Working at heights</b> .....	176
7.13	<b>Cranes and lifting equipment</b> .....	176
7.14	<b>Temporary Works (Scaffolding, support work, formwork)</b> .....	176
7.15	<b>Auditing</b> .....	177
7.16	<b>Mechanical installations</b> .....	177
7.17	<b>Communication on Site</b> .....	177
7.18	<b>Care of Workers on Site (Welfare)</b> .....	177

7.19	Discipline, Alcohol and Substance Abuse.....	178
7.20	Electrical Equipment .....	178
7.21	HIV and AIDS Programme.....	178
7.22	Safety Conflict.....	178
8.	HEALTH AND SAFETY FILE .....	178
9.	NON-CONFORMANCES .....	179
9.1	Failure to Comply with Provisions.....	180
10.	MEASUREMENT AND PAYMENT.....	180

## ANNEXURES

ANNEXURE A:	EXAMPLE HEALTH AND SAFETY AUDIT DOCUMENT
ANNEXURE B:	CLOSE OUT REQUIREMENTS
ANNEXURE C:	NON-CONFORMANCES
ANNEXURE D:	CONTRACTORS MONTHLY HEALTH AND SAFETY REPORT
ANNEXURE E:	RISK ASSESSMENT FORMAT
ANNEXURE F:	BILL OF QUANTITIES FOR OCCUPATIONAL HEALTH AND SAFETY
ANNEXURE G:	HEALTH AND SAFETY (H&S) PRE-TENDER REPORT
ANNEXURE H:	TENDER STAGE OHS PLAN EVALUATION
ANNEXURE I:	MANDATORY AGREEMENT



## 1. LIST OF ABBREVIATIONS

AIA	Approved Inspection Authority
BoQ	Bill of Quantities
CC	Compensation Commissioner
CR	Construction Regulations
DMR	Driven Machinery Regulations
DoL	Department of Labour
FEMA	Federated Employers Mutual Association
GAR	General Administration Regulations
GSR	General Safety Regulations
HCSR	Hazardous Chemical Substances Regulations
HIRA	Hazard Identification Risk Assessment
H&S	Health and Safety
ER	Engineer's Representative
LI	Labour Intensive
OH	Occupational Health
OHS	Occupational Health and Safety Act No. 85 of 1993 (as amended)
OHSS	Occupational Health and Safety Specification
PSHSS	Project Specific Health and Safety Specification
PC	Principal Contractor
PPE	Personal Protective Equipment
SANS	South African National Standards (Authority)
MSDS	Material Safety Data Sheet
SMME	Small, Micro, Medium Enterprise
SWP	Safe Work Procedure

## 2. DEFINITIONS

The definitions used will be those set out in the Construction Regulations, Gazette No 37305 of 7 February 2014 which are hereunder further emphasised with the following additions:

**Client:** Harry Gwala District Municipality

**Construction Site:**

Means a work place where construction work is being performed

**Construction Supervisor:**

Means a competent person responsible for supervising construction activities on a construction site

**Designer:** Means a competent person appointed by the Client as Agent to design, supervise and monitor construction on their behalf.

**Fall Risk:** Means any potential exposure to falling either from, off or into

**Hazard:** Source of or exposure to danger

**Hazard Identification and Risk Assessment (HIRA) and Risk Control:**

Means a documented plan, which identifies hazards, assesses the risks and details the control measures and safe working procedures which are to be used to mitigate and control the occurrence of hazards and risks during construction or operation phases.

**Health and Safety Agent:**

Means any competent person who acts as a representative for the Client in managing the projects health and safety and who is registered with the South African Council for the Project and Construction Management Profession (SACPCMP).

**Health and Safety Plan:**

Means a site, activity or project specific documented plan in accordance with the Clients Health and Safety Specification.

**Induction Training:**

Means once off introductory training on general health and safety issues given to all employees and visitors to the site before commencement of work on site.

**Risk:** Means the probability or likelihood that a hazard can result in injury or damage.

**Regulation/s:**

Shall mean the relevant regulation/s promulgated in terms of the Occupational Health and Safety Act, No. 85 of 1993.

### Temporary Works:

Means any falsework, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work

**The Act:** Means, unless the context indicates otherwise, the Occupational Health and Safety Act, No. 85 of 1993 and Regulations promulgated thereunder, as amended.

### 3. KEY REFERENCES

The following key references apply to the specifications:

- Occupational Health and Safety Act No. 85 of 1993 and Regulations (as amended)
- Compensation for Injury and Occupational Diseases Act No. 100 of 1993 (as amended)
- SANS Code 1921-6
- SANS Code 1200

### 4. INTRODUCTION

Harry Gwala District Municipality is responsible for the provision of adequate and reliable potable water and sanitation services within the district and takes cognizance that its current scope of works pose inherent risks to the health and safety of its agents and members of the public.

Each year fatalities, serious injuries and poor attitudes of Contractors mar the reputation of the Construction Industry. Harry Gwala District Municipality has a responsibility to limit its risk by ensuring a zero tolerance and better practice approach to Contractors and those affiliated to a particular project. Thus a high premium is placed on the health and safety (H&S) of Harry Gwala District Municipality stakeholders, which include its employees, professional service providers, public and its physical assets. The responsibilities that the Harry Gwala District Municipality and relevant stakeholders have toward its employees are captured in, but not limited to this document. The responsibilities stem from both moral, civil and a variety of legal obligations. The Principal Contractor is to take due cognisance of the above statement.

Harry Gwala District Municipality, as the Client and where there is an appointed H&S Agent on its behalf, shall provide a project specific Health & Safety Specification (PSHSS) for the project and provide the Principal Contractor/s making a bid or appointed to perform construction work for the project, or parts thereof.

#### 4.1 Purpose of the Project Specific Health and Safety Specification (PSHSS)

The PSHSS is a performance specification to ensure that the Client and any bodies that enter into formal agreements with the Client viz. Agents, Professional Service Consultants (Engineers, Quantity Surveyors and Land Surveyors), Principal Contractors and Contractors achieve an acceptable level of OHS performance. No advice, approval of any document required by the PSHSS, such as hazard identification and risk assessments, or any other form of communication from the Client shall be construed as acceptance by the Client of any obligation that absolves the Principal Contractor from achieving the required level of performance and compliance with legal requirements. Furthermore, there is no acceptance of liability by the Client, which may result from the Principal Contractor failing to comply with the PSHSS, i.e. the Principal Contractor remains responsible for achieving the required performance levels.

A Mandatory Agreement in terms of Section 37.2 of the OHS Act will be signed between parties prior to any works commencing.

The PSHSS highlights the aspects to be implemented over and above the minimum requirements of current legislation. Requirements may be changed should new risks or issues are identified that could not have been foreseen during the design phase of the project, or during the construction phase. Any new legislation or standards (legislated, or determined by Harry Gwala District Municipality) that are promulgated or accepted during the contract will automatically be applied.

Environmental management shall receive due attention as per the requirements of the Environmental Control Officer (ECO), but will be managed by the ECO directly.

#### **4.2 Implementation of the Project Specific Occupational Health and Safety Specifications (PSHSS)**

The project specific H&S specification (PSHSS) forms an integral part of the Contract, and PCs are required to make it an integral part of their Contracts with Contractors and Suppliers. A PSHSS will be available for each level of Contract and Contractor and must be complied with.

This specification must be read in conjunction with the OHSA, Regulations (as amended) and any other standards relating to work being done and ensure compliance thereto. The information relative to the scope of the project, the works etc. are detailed in the tender, are to be considered when developing the H&S plan and associated documentation.

The OHSA S.37.2 Mandatary Agreement must be fully completed by the PC, supplied by the Client. These documents shall be deemed to form part of the returnable Contract Documents.

No work may commence without written approval of the H&S plan by the H&S Agent, or the responsible person in the Harry Gwala District Municipality.

Should there be design changes, or change in the scope of works, an amended PSHSS may be issued. Where amended PSHSSs are issued, the PC will be required to ensure a resubmission of an amended H&S plan for approval. Further to this, the PC must ensure that similar information must be provided as it applies to the works to all their Contractors, within 5 working days following notification thereof. The H&S Agent will visit the project as deemed necessary by the Designer and the H&S Agent to ensure compliance and limit risk. All activities on the site and all appropriate documentation will be monitored and reported on to the Client and the Designer.

Non-conformances will be issued and penalties or work stoppage will be issued where appropriate. Communication between the H&S Agent and the PC will be through the Designer (or Client's responsible person) as determined at the commencement of the project.

#### **4.3 Requirements at Tender Stage**

Tenderers are required to submit a pre-tender H&S plan with their Tender submission.

The documentation submitted will be used to assess the competence of the tenderer, as required in the CRs, therefore the information submitted needs to be complete and as close as possible to the final product.

Adequate pricing for H&S is required, and the appropriate section in the BoQ is to be completed. Failure to do so could result in the Tender being regarded as non-responsive.

The PC shall ensure adequate information is submitted as supporting documentation with his completed Tender. Such information will be assessed against the criteria listed and a score provided to the Bid Award Committee (BAC) for consideration. Failure to provide such information could render the tender application non-responsive.

A project specific H&S Plan in response to this PSHSS will be subject to approval by the H&S Agent. This must include all supporting documentation as required to verify the H&S system:

- A declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Occupational Health and Safety Act and its Regulations;
- A valid Letter of Good Standing;
- Detailed technical method statements for approval by the Designer and appropriate risk assessments and safe work procedures for approval by the H&S Agent or Client:
  - Site establishment including:
    - Clearing and grubbing;
    - Exposure of services, power, telecommunication etc.;
    - Arrangements for hoarding, traffic accommodation;
  - Excavating
  - An emergency plan indicating how and where emergencies will be handled
  - Working at heights
  - Appointments of the following: Construction Supervisor; Construction Health and Safety Officer; Risk Assessor: Fall Protection Plan Developer; First Aider.
  - An organogram of the site relationships showing at least the above appointments

Further method statements are to be submitted prior to, and during the project where changes or new work is required, and the approval of the Designer/Client is required before work on that aspect or activity can commence. The H&S Officer is to be included in production planning sessions/meetings to ensure that the appropriate risk assessments, safe work procedures and communication required are available and completed timeously. Penalties will be applied should this not be adhered to, and deemed a serious offence.

## 5. GENERAL REQUIREMENTS

### 5.1 Summary of Risks identified during Design

The intention of the summary of findings from the design risk assessment is to highlight the residual risks identified during the design phase. The summary of risks provided is to point the contractor towards some risks he may not be aware of during tendering stage and while developing his formal risk assessments for the project.

The design risks and the management thereof should be included in the Principal Contractors (PC) risk assessments. Where there are other Contractors appointed to do work, the PC is to ensure that Contractors include such information in their risk assessments.

The Contractor is herein advised that no other residual risks remain which the designers judged as significant and unusual other than those risks that a competent Contractor can reasonably be expected to know or deduce from the documents prepared for this project and supplied to them.

### 5.2 Specified Hazardous Chemical Substances

The following lists of products or substances are those which have been identified as likely to be used on the project. This list is not inclusive and other products may be considered. Where the PC is likely to supply the product as the product has not been specified, material safety data sheets (MSDSs) need to be considered prior to all selections.

PRODUCTS or SUBSTANCES	POTENTIAL HEALTH OR OTHER RISKS
Cement	<ul style="list-style-type: none"> <li>• Hand mixing may occur, 50kg bags are an ergonomic risk from handling.</li> <li>• Pumping of concrete may produce extensive vibration, extended hours of work, and potential eye, skin and respiratory irritant from dust exposure, chromates.</li> </ul>
Cement/Silica dust	Caused by cutting, grinding, sanding of any concrete/granite/tiled surface/masonry resulting in occupational respiratory health illness or disease
Petrol/diesel/lubricants	Potentially a fuel bowzer on site. Fire, spillage, fumes
Adhesives	Used as a bonding agent and may result in contact Dermatitis and occupational respiratory illness or disease from prolonged exposure
Plaster/mortar/screeds	Contact with products may result in Dermatitis and occupational respiratory illness or disease from prolonged exposure
Sealants/joint fillers	Contact with products may result in Dermatitis and occupational respiratory illness or disease from prolonged exposure
Welding fumes	Inhalation of fumes may result in occupational respiratory illness or disease from prolonged exposure
Lime	The product is classified an irritant, irritating the respiratory system, skin and risk of serious damage to eyes. In contrast to the powder itself, the product, when diluted with water, can produce severe skin damage in humans, ( <i>alkaline burns</i> ), especially if prolonged skin contacts takes place.
Paints	Contact with different paints may result in Dermatitis and occupational respiratory illness or disease from prolonged exposure

## 6. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

### 6.1 Structure and Organization of H&S Responsibilities

#### 6.1.1 Notification of Commencement of Construction Work

The Client shall notify the Provincial Director of the Department of Labour (DoL) in writing, in the form of the Annexure 1 in the CRs for all projects requiring a work permit in terms of CR 3.

The PC who intends to carry out any construction work other than work noted in CR 3 shall notify the Provincial Director in writing in the form of the Annexure 2. This shall occur after the award of the contract, but before commencement of construction work. Proof of submission and/or receipt must be provided and kept in the H&S file. Work will not commence without the Notification being correctly completed and signed by the Client and proof of receipt by the Department of labour received. The Notification shall only be signed by the Client following the approval in writing by the H&S Agent, or the Client.

Where changes to the conditions given in the submission are required (i.e. Contractors, completion dates, increase in workers), a revised Annexure 1/2 must be submitted to the Department of Labour. The completion date is to include the defect and liability period. A copy of the notification form and any further submissions/correspondence must be kept in the H&S file.

### 6.1.2 Health and Safety Plan Framework

The H&S aspects related to the project outlined in the previous sections are to be taken into account when drawing up the H&S Plan. The PC is required to demonstrate competence by providing an H&S system that will address the requirements of the project.

The current legislative requirements, SANS codes and any other standards that may guide practice are to be taken into consideration. The following aspects must be addressed in the H&S Plan as they play a role in reducing the overall risk of a particular activity, or section of the project. The H&S Agent may from time to time request additions or systems as they relate to the works or legislative requirements at the time.

The PC is to prepare a site layout drawing to indicate at least the following:

- The positions of site offices of all Contractors, toilets, drinking water and worker rest areas;
- Indicate the positions of emergency personnel and equipment (fire, first aiders, first aid posts);
- Protection of plant and pedestrians, indicate parking, and
- Storage areas (materials and equipment, waste etc.)
- Access and egress to site for deliveries and intended temporary traffic management
- Emergency assembly point

Such layouts are to be updated regularly throughout the project.

### 6.1.3 Appointment of Competent Site Personnel

The CEO (OHSA S16.1) of the PC will take overall responsibility for the appointment of competent site staff for the duration of the project. Should the CEO not be personally involved in the project, the H&S responsibilities are to be delegated to the Contract Manager (OHSA 16.2). Knowledge and training in H&S is required, and certificates indicating H&S training as well as experience to be included in CVs.

All other legal appointments are to be made with relevance to the type of work required and kept current with the project programme. The construction team is to ensure the appointed H&S Officer is kept up to date with all planned activities, to ensure all H&S requirements are met.

All construction/technical method statements are to be generated by senior site personnel, and the appropriate risk assessments developed therefrom in conjunction with the H&S Officer.

The Occupational Health and Safety Plan shall include the following, but is not limited to the following key appointments:

### 6.1.4 Construction Supervision

Competent supervisors will be appointed to manage part or all of the works and have training and/or experience in the area of responsibility. All site supervisors must show evidence of appropriate training in H&S, and an understanding or training in areas of responsibility (i.e. risk assessments, method statements etc.).

Curriculum Vitae (CVs) are to be submitted for approval by the Designer, and/or Client. The Supervisor will be held responsible for the safety of working teams and subordinates, housekeeping and stacking and storage of materials.

### 6.1.5 Construction Health and Safety Officer

The PC will employ at least one competent, full-time or part time H&S Officer for the duration of the contract depending on the nature of the hazards on site and subsequent risks. The H&S Officer's CV is to be submitted for approval by the H&S Agent or the Client, at time of tender. The PC is to ensure adequate resources are provided in order to undertake all responsibilities (i.e. mobile phone, computer and internet access, vehicle etc.)

Qualifications shall include at least Grade 12, SAMTRAC/NEBOSH/Diploma in H&S qualifications or similar together with additional appropriate short courses (ie. Fall Protection Developer, Risk Assessor, Basic Firefighting and First Aider Level 1) with exposure to civil engineering and building that is appropriate given the level of project complexity and registration with SACPCMP. An in-depth knowledge of legislative requirements and the application thereof is required. The site supervisor may not act as the H&S Officer.

The H&S Officer/s will be held responsible for all H&S on the project.

- Senior site staff and supervision, Contractors are to follow systems, instructions etc. given by the H&S Officer at all times;
- No new workers or Contractors may commence work without approval or following the H&S plan as submitted, and
- No inductions of Contractor staff until the H&S documentation is approved by the H&S Officer.
- The H&S Officer/s may not be removed or replaced without the approval of the H&S Agent, nor may the site be left unattended for more than 1 day without adequate, competent cover.

A monthly report of all H&S activities and incidents is required by the end of the first week of each month, or at a date agreed to by the H&S Agent/Client and the H&S Officer. An example of the monthly report is attached as an *Annexure D*.

The H&S Officer will be responsible for collating the H&S documentation at the close out of the project in electronic format. A list of the typical aspects that should be provided is available as *Annexure B* to this document. The PC is to ensure that all Contractors documentation follows the same requirements and closed out H&S documentation must be completed and be available with the close out of the main contract.

Failure to do so will be considered a serious offence and penalties applied.

#### **6.1.6 Traffic Safety**

The H&S Officer will be responsible for ensuring that daily traffic management is adequately managed and additional care must be taken where workers and public interface.

No worker may be transported in, or on the rear of construction vehicles (bakkies included), or with plant and materials to, on, or from site. The number of passengers in any vehicle is limited to what is stated on the license disc. Vehicles used to transport workers to, from, or on site, shall have secure seats and be covered. No canopies may be used.

Tenderers must indicate in their OHS plans what type of transport is envisaged and how this will be managed.

Penalties will be issued for non-compliances noted.

#### **6.1.7 Health and Safety Representatives and H&S meetings**

H&S Representatives representing workers and Contractors are to be appointed following the startup of the project, irrespective of the number of workers on site. The appointed H&S Representatives are to be actively involved with H&S and will assist the H&S Officer and site management in meeting legislative duties.

The H&S Officer shall further ensure that H&S is discussed at all internal production or progress meetings. Issues arising from the H&S Agent audits are to be discussed, as well as all H&S related issues.

Minutes are to be kept for all H&S interventions and meetings. Failure to do so will be deemed to be a moderate offence.



### 6.1.8 Appointment of Competent Contractors

The Principal Contractor is to ensure compliance with the Clients minimum standards and all legislative requirements. The same H&S standards required of the PC are to be applied to all Contractors. An index of all Contractors and Suppliers is to be on file and kept updated at all times. The PC is to ensure there is sufficient funding for H&S compliance by each Contractor.

The following minimum aspects are applicable to any Contractor appointed:

- The H&S Officer is to ensure a Contractors appointment and approval of H&S documentation at least seven (7) working days prior to commencing work.
- No Contractor may work under the PCs Compensation registration number. If required the PC may assist SMMEs with their registration with the Compensation Commissioner. However, such Contractors will not be able to commence work until proof of registration or Letter of Good Standing has been received.
- No work may commence without Mandatary agreements between parties in place.

The following aspects are applicable to Suppliers or short-term works (surveying, repairs, servicing, deliveries etc). Cognisance is to be taken of the level of risk involved and the H&S Officer is to ensure the level of H&S documentation is appropriate:

- Mandatary agreements in place
- Letter of Good Standing
- Method statements and risk assessments
- Available information relative to:
  - Load testing and registers for cranes or lifting devices
  - Medical certificates of fitness
  - Material Safety data sheets (MSDSs)

Failure to provide written approval of H&S documentation will be considered a serious offense, and could result in aspects of, or all the activities being stopped, and penalties implemented.

## 7. GENERAL RISK MANAGEMENT

### 7.1 Health Risks and Medical Surveillance

The appropriate MSDSs are to be obtained for all products and used to develop the H&S documentation as they relate to the works. Many of the processes may be labour intensive and ergonomic risks are to be noted. All workers (including Contractors) are to be included in the medical surveillance programme.

Workers will be exposed to noise, dust, and physical risks from extended periods of work of a repetitive nature, materials specified and the general nature of the works.

All workers (including those of Contractors) are required to be in possession of a medical certificate of fitness prior to commencing work.

Full medical records are not to be placed in the H&S file. Given the potential health risks the following aspects are to be included in each medical surveillance intervention:

- Full medical, surgical and occupational history;
- Full physical examination of all systems; and
- Referral if required for the management of identified health issues that may affect the worker.

Specific testing for existing conditions and limitations relative to exposure could include, but are not limited to:

- Audiometry (hearing tests); and
- Any other tests identified as relevant from chemical or specifically identified risks of exposure

Failure to do so will be considered a serious offence.

## 7.2 Noise Risks

All plant from plant hire companies (suppliers) or that of the PC is to be compliant with the Noise Induced Hearing Loss Regulations. Plant identified that has not been tested and marked for noise emissions will result in having to be tested at the Contractors or PCs expense. Failure to do so within a reasonable time period will result in such plant being removed from site.

Audiometric testing of all workers is noted as required in the medical surveillance programme for all permanent workers prior to work commencing. Temporary labour working in identified noise areas will require testing if the noise levels are indicated on plant or through processes as greater than 85dB. Audiometry records are to be available in the H&S file.

Suitable SANS approved hearing protective equipment shall be issued and worn where noise levels are identified as equal to or greater than 85 dB.

Failure to do so will be considered a serious offence.

## 7.3 Emergency Procedures

A simple emergency plan and procedure that is appropriate to the risks is required prior to commencement on site. It is advised that the system should be simple and easy for any worker to follow. The plan may be adapted should new information or risks are identified.

The procedure shall detail the response plan in relation to the works, and include at least (*but are not limited to*) the following key elements:

- Appointment of a competent emergency response co-ordinator
  - Site Camp Fire;
  - Public injury, Motor vehicle accidents;
  - Falls from heights;
  - Serious injury to workers (medical or work-related); and
  - Any other major risks identified during risk assessments

The emergency plan is to ensure the inclusion of local service providers where possible. Such arrangements should be made with these persons prior to the commencement of the project. The general principals of emergency management are to be applied as it applies to the hierarchy of control and management.

## 7.4 First Aiders and First Aid Equipment

At least 1 first aider will be trained to Level 3. First aiders shall be available and accessible on site at all times, and be able to work as a team when responding to any emergency on the project.

Contractors are expected to ensure compliance and provide/manage their own first aiders and equipment. The number of First aiders will be determined by the complexity and exposed risks of the project, not numbers of workers

Appropriately stocked first aid kits are to be available at all times and to assure continual availability and access on site.

## 7.5 Fires and Emergency Management

The emergency plan is to include the risk of fire on site and related to any specific activities where gas, welding, cutting etc. occur.

Fire extinguishers will be appropriate for the risk and in sufficient numbers to deal with the type of fires that could occur. All mobile plant is to have fire extinguishers. Hot work permits are required for any such activities.

## 7.6 Incident Management and Compensation Claims

All incidents and accidents are to be investigated. All serious incidents involving any form of disabling injury or fatality are to be reported to the Designer /Client /H&S Agent immediately. This shall be confirmed in writing following the incident. Full details are to be included in each site meeting or when the Client visits site. A summary of incidents is to be included in the monthly report.

Failure to comply with emergency provisions will be considered a serious offence, and the operation or project may be stopped if deemed inadequate for the work at the time of assessment or site inspection.

## 7.7 Personal Protective Equipment (PPE) and Clothing

The PC is to provide a procedure as an addendum to indicate how PPE is managed within the Company.

The wearing of the identified SANS approved PPE at all times is non-negotiable. The PC shall ensure that all workers (Including Contractors) are issued with and shall wear:

- Hard hats;
- Protective footwear;
- Overalls that ensure worker visibility;
- Eye protection;
- Hearing protection;
- Reflective jackets (no bibs)
- Respiratory protection (minimum of FF2), and
- Any other necessary PPE identified from MSDSs and/or risk assessments.

Adequate quantities of PPE shall be available. This shall include necessary PPE for visitors. The procedure for managing PPE is to be in a formal procedure submitted with the H&S plan for approval.

Any person (*including Client, Designers etc.*) found on site without the necessary PPE will be removed from site until the PPE is supplied and worn.

Failure to comply will result in penalties being applied.

## 7.8 Occupational Health and Safety Signage

On-site H&S signage is required. Signage shall be posted up at fixed or temporary working areas, or other potential risk areas/operations. These signs shall be in accordance with the requirements of the General Safety Regulations or SANS requirements as amended. Signage is to be noted on the site drawings indicating where fixed/temporary signage is required.

Temporary signage is to include (*but not be limited to*) the following:

- 'Report to site office' / 'Warning: Construction Site – Keep out' or similar;
- 'Site office' (if relevant);
- 'hard hat area' or other PPE requirements noted;
- First aid box positions (*including vehicles*); and
- Fire extinguishers.

Signs shall be posted at areas of work on site indicating that a construction site is being entered and that persons should take note of H&S requirements.

Failure to comply will result in penalties being applied.

### **7.9 Induction of Employees and Visitors, General H&S Training**

A simple, formal induction programme is to be submitted as an addendum for approval with the H&S plan. Inductions must be carried out for all workers and visitors (*including Client, Designers*) to the site.

Pre-task training is required to ensure workers are familiar with the risks and H&S measures of the work or tasks to be done. Such training is to be done at least daily. A record of inductions and pre-task training is to be kept in the H&S file.

Any person found on site without proof of induction will be removed from site until the proof is supplied and, a penalty issued per non-compliance.

### **7.10 Management of Plant and Equipment**

Close control of plant and equipment is required, including that of Contractors.

Daily monitoring of all plant and equipment is required prior to commencing work. Full lists of hired and own plant are to be available at the H&S Agent's/Client audit. All daily inspection records are to be kept in the H&S file or Contractors where plant and equipment is brought onto site. Registers are not to be more than 1 week behind.

Only competent, medically fit plant operators are to be used. Medical certificates of fitness are required for all operators. Any plant or slings used to lift plant or material require annual load testing by an AIA, and all certificates must have the testers LMI/E number. Operators are to be adequately trained and certified to operate mobile cranes or crane trucks. Certificates and registers are to be placed in the H&S file.

Failure to do so will be considered a serious offence.

### **7.11 Excavations**

A procedure for managing excavations is to be provided as an addendum to the H&S plan describing how excavations are to be managed.

Excavation method statements are to be approved by the Designer and associated risk assessments are required. Designs by competent persons are required where ground conditions are deemed to require shoring.

A competent person is to be appointed for managing all excavations. A permit system is to be available and used for all excavations. All equipment and ground conditions are to be checked daily and prior to work commencing.

Excavations should preferably not be open beyond what can be closed daily. Where excavations need to remain open, all excavations are to be properly protected. Adequate stakes with 1m high demarcation and berms/spoil are required to be a safe distance from the edge of the angle of repose. Danger tape may not be used to demarcate excavations. Cognisance is required of the surrounding area and increased levels of protection are required where work is in the vicinity of members of the public.

Work will be stopped, and penalties applied to any work in excavations that is not compliant.

### 7.12 Working at heights

A Fall Protection Plan (FPP) is to be available and supplied as an addendum to the H&S plan. The FPP must be appropriate for the project. Method statements, appropriate risk assessments, safe work procedures and training are to be available prior to work commencing.

Construction drawings shall be required for all temporary structures as they relate to the project. The drawings shall be accompanied by full calculations, design loads and any relevant test results as required by the SANS code and ensure adequate allowance for the development of appropriate documentation and training. All drawings are to be checked and signed by a competent structural engineer (registered with ECSA).

The focus for working at height shall include fall restraint systems where possible except during assembling or dismantling top components or where it is not deemed safe. The relevant SANS codes are to be applied as they apply to the works and the project, such as:

- SANS 10085
- SANS 50355
- SANS 50361
- SANS 50355

Should part of the works be contracted out, competent Contractors are to be appointed and submit documentation according to the project requirements. The PC is to note if such work is to be contracted to specialists in the H&S Plan. The plan is to be developed by and work managed by a competent person for the duration of the project. The following aspects must be included:

- The public are to be protected at all times by way of hoarding, barricading or fencing
- Notices to be posted
- Restrictions or stoppage when weather conditions are deemed hazardous
- Permit system for working at heights
- Prevention of falling tools or equipment
- Link to emergency plan regarding rescue
- All workers are to be in possession of valid certificates of fitness that extend for the duration of the works. Note the requirements in the section relating to medical surveillance.
- Registers and all relevant documentation are to be placed in the H&S file.

Work will be stopped, and penalties applied to any work at heights that is not compliant.

### 7.13 Cranes and lifting equipment

Should any form of lifting device or crane (fixed or mobile) be used during the project for deliveries, moving of supplies or equipment, the appropriate documentation must be made available. Method statements, risk assessments, safe work procedures and training are to be available prior to work commencing. A procedure for managing loads and lifting must be made available as an addendum to the H&S Plan.

### 7.14 Temporary Works (Scaffolding, support work, formwork)

Temporary works must be properly designed and signed off by a competent person who has sufficient experience in the design of the type of temporary work in question to be able to assess the design. The appropriate competent persons are to be appointed to manage and monitor such works to the satisfaction of the Engineer and H&S Agent. Records and registers are to be properly completed and kept in the H&S file. If temporary works are to be erected by a Contractor, this must be notified to the Designer/H&S Agent.

Failure to do so will be considered a serious offence.

### **7.15 Auditing**

Frequency of external auditing by the H&S Agent or Client will be as agreed with the Client and Designer but will at least conform to the requirements of the Construction Regulations. The site will be inspected, and the documentation audited relative to the activities and H&S plan. The H&S Officer of the PC must accompany the Client, or the H&S Agent, on all audits and inspections. Not all audits will be, or need be announced.

The PC will ensure that all their Contractors are audited at a frequency determined by the H&S Agent or Client. Audit frequency may be increased if Contractors are not performing adequately. Audit results will be acted upon and non-conformances and penalties issued where deemed appropriate. The Client, Designer or H&S Agent may act or require further outcomes if non-compliances are noted or unsafe acts are noted on site.

Internal audits are to include site conditions as well as ensuring H&S files are appropriate, and compliant. Comprehensive audit reports are to be made available, the format of the audit reports are to be acceptable by the H&S Agent.

The PC will be audited using a template as supplied in the tender document. The audit template will be adjusted from time to time relative to the activities on site. A similar process is to be used by the PC when auditing their Contractors on site. Compliance with legislative requirements and the systems provided by the PC to manage the H&S on site will be measured. Full compliance is required. Time limits for corrective actions will be set and must be adhered to.

Failure to address findings or non-conformances will be considered a serious offence.

### **7.16 Mechanical installations**

All mechanical installations are to be carried out in conformity with the manufacturer's instructions. Method statements and risk analyses must be compiled for each type of installation. A competent person must be designated to supervise the work.

### **7.17 Communication on Site**

All H&S communication during the project between the H&S Agent and the PC will be done through the Engineering Consultant and be in writing, including the issue and responses to non-conformances and H&S audit results.

Failure to address issues timeously will be considered a serious offence.

### **7.18 Care of Workers on Site (Welfare)**

Adequate toilets, clean, safe drinking water and decent shelter will be afforded workers at all times. Toilets will be within reasonable distance of workers, or placed with each working team in safe, with reasonable privacy. Hand washing facilities will be provided. Arrangements made where existing facilities are shared with existing users must be made in writing and placed in the H&S file.

Failure to ensure compliance will be considered a serious offence.

### **7.19 Discipline, Alcohol and Substance Abuse**

All employees (management included) are to follow instructions given in the interest of H&S. A disciplinary procedure is to be developed and disciplinary action is to be imposed on those who do not follow such instructions or company rules or policies.

No person is allowed to work or access site if under the influence of alcohol or other substances that could impact on their own or others safety. The PC is to have a drug and alcohol policy available to manage such instances.

These requirements are applicable to any employee of any organization providing services on site. Penalties may also be applied by the Client, OHS Agent or Engineer.

### **7.20 Electrical Equipment**

In addition to the requirements of the Electrical Machinery Regulations and the General Machinery Regulations any electrical distribution board used for construction work shall be fitted with suitable earth leakage protection. Leads must be properly and firmly connected. Plugs and sockets shall be in good and safe condition.

All electrical apparatus, other than electrical hand tools, shall have a physical "lock out" system which will prevent any operation other than that authorized by a supervisor. A "lock out" sign shall be displayed when the apparatus is not in use. Method statements and safe work procedures will be required for all work involving electrical apparatus.

### **7.21 HIV and AIDS Programme**

The PC shall reduce the risk of transfer of HIV between and amongst construction workers and the local community, raise awareness amongst construction workers of the risk of infection with HIV, promote early diagnosis and assist affected individuals to access care and counselling by:-

- making condoms that comply with the requirements of SANS 4074 available for the duration of the contract to all construction workers at points on the site which are readily accessible and suitably protected from the elements
- either by placing and maintaining HIV/AIDS awareness posters of the size not less than an A1 in areas which are highly trafficked by construction workers or providing construction workers with a pamphlet in languages largely understood by the construction workers which reinforces the outcomes of the HIV/AIDS awareness programme
- encouraging voluntary HIV/STI testing
- providing information concerning counselling, support care of those that are affected

### **7.22 Safety Conflict**

Where any conflict exists between the requirements of this PSHSS, the Site Rules or Statutory Requirements/Regulations the higher standard must apply unless such conflict is brought to the attention of the Client or H&S Agent and a direction provided. The PC is deemed to have allowed for the higher standard.

The PC is legally responsible for ensuring that he conforms to all applicable aspects of the Occupational Health and Safety Act 85/1993 and Regulations (OH&S Act) and other relevant Acts and Regulations. If in dispute with the PSHSS and other legislation the most stringent requirement must apply.

## **8. HEALTH AND SAFETY FILE**

The documentation submitted and approved following the awarding of the contract will be used to form the H&S file. The H&S file is required to be laid out in a logical manner, and documentation filed within the file is to be easily accessible.

The following completed information shall be included (*but not be limited to*) as part of the index:

- The PSHSS;
- The H&S Plan and the approval by Client;
- Appointment by Client;
- Mandatary agreement with Client;
- Notification of construction work;
- A record of all working drawings, calculations and design where applicable;
- Detailed list of Contractors with contact details, appointments, Mandatories etc., H&S specifications issued;
- Record of Competencies (CVs) and appointments;
- Training Records;
- Permits;
- Method statements;
- Risk assessments;
- Safe work procedures;
- Emergency and injury management;
- Material Safety data sheets
- Medical surveillance records;
- Registers; and
- Records of audits, minutes etc.
- Plant lists
- Temporary electrical installations
- Employee records (*who is on site*)

**9. NON-CONFORMANCES**

Should, at any time, the works, or part of the works, be stopped due to unsafe acts or non-compliance with the Clients or PCs H&S Plan; neither the PC nor any other Contractor shall have a claim for extension of time or any other compensation.

The following constitute examples of the types of non-conformances that will attract penalties:

<b>Minor: Penalty: R50/count</b>	<b>Medium: Penalty: R500/count and a non-conformance</b>	<b>Severe Penalty: R5000/count, a non-conformance and/or activity stoppage</b>
Non-use of PPE supplied	Toilets not supplied or regularly serviced; lack of drinking water	Contractors working without Health and Safety Plan approval
Non completion of registers for plant and equipment on site	Contractors not audited	Workers transported in contravention of the OHS plan or legal requirements
Lack of H&S signage at work areas	Working without training or the appropriate, approved H&S method statements	Invalid Letters of Good Standing
Tools and equipment identified in poor condition during inspections	Legal non-conformances identified during the previous audit and not addressed within the agreed time frame	Non-compliance with traffic accommodation requirements: layout or physical conditions



<b>Minor: Penalty: R50/count</b>	<b>Medium: Penalty: R500/count and a non-conformance</b>	<b>Severe Penalty: R5000/count, a non- conformance and/or activity stoppage</b>
	No monthly OHS report at site meeting to report on	Any serious breach of legal requirements
	No certificates of fitness for workers as required	
	Working without approved method statements	

**9.1 Failure to Comply with Provisions**

Failure or refusal on the part of the PC or their Contractors to take the necessary steps to ensure the safety of workers and the general public in accordance with these specifications or as required by statutory authorities or ordered by the Principal Agent (PA), shall be sufficient cause for the PA to apply penalties as follows:

- (i) A penalty as shown in the Table above shall be deducted for each and every occurrence of non-compliance with any of the requirements of the PSHSS.
- (ii) In addition, a time-related penalty of R500,00 per hour over and above the fixed penalty may be deducted for non-compliance to rectify any non-conformance within the allowable time after a site instruction to this effect has been given by the PA. The site instruction shall state the agreed time, which shall be the time in hours for reinstatement of the defects. Should the Contractor fail to adhere to this instruction, the time-related penalty shall be applied from the time the instruction was given.

**10. MEASUREMENT AND PAYMENT**

The payment items for Occupational Health & Safety are contained in the Bill of Quantities. The same rules are applicable in respect of the pricing of these items as for every other payment item. Attention is drawn to the Pricing Instructions in this document.

**Item and Unit**

**C.01 Preparation of Contractor’s Project Specific Health and Safety Plan. (Lump Sum (L.S))**

The rate for this item must cover all expenses incurred in preparing the Contractor’s project specific Health and Safety Plan as required by the Client’s project specific Health and Safety Specification in this document.

**C.02 Principal Contractor’s initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations. (Lump Sum (L.S))**

The full amount will be paid in one instalment only when the Client’s Agent has verified and approved the following

- (a) The Principal Contractor has notified the Provincial Director of the Department of Labour in writing of the project, Annexure 2 to the Regulations.
- (b) The Principal Contractor has made the required initial Appointments of Employees and Contractors.
- (c) The Client has approved the Principal Contractor’s project Health and Safety Plan.
- (d) The Principal Contractor has set up his Health and Safety File.

**C.03 Principal Contractor’s time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations. (Month (Mth))**

The amount shall represent full compensation for that part of the Principal Contractor's general obligations in terms of the Occupational Health and Safety Act and Regulations which are mainly a function of time. Payment will be

made when the Client's Agent has verified the Principle Contractor's compliance as part of the audit. This will include the updating and administration of the Health and Safety file.

**C.04 Provision of Personal Protective Equipment (PPE) as listed in the Bill of Quantities. (Number (No))**

The rates for these items shall include for the procurement, delivery, storage, distribution and all other actions required for the supply of PPE to the employees of the Principle Contractor, full or part time, requiring them. Sub-Contractors are responsible for their own costs in this regard. Any items of PPE not included on the list will be paid for only after the PA has agreed to their acquisition.

Items listed will include, among others which may be noted, are: hard hats, reflective vests, high visibility overalls, protective foot wear, fall arrestor harness, gloves, ear muffs, earplugs and dust masks of appropriate type. Normal items such as standard overalls, waterproof clothing, gum boots and standard workshop safety equipment such as welding masks and goggles will not be paid for.

Payment will be based on the issues register for PPE as kept by the Construction Health and Safety Officer, backed up by paid invoices if requested.

**C.05 Provision of a Full/Part Time Construction Health and Safety Officer (Month)**

The Tender sum shall include for the cost of a Construction Health and Safety Officer on a fulltime or part time basis.

**C.06 Costs of Medical Surveillance (Unit (No))**

This item shall covers all costs in involved in the obtaining of baseline medical examinations of temporary labour, including operators for mobile plant as contemplated in CR 23(d) (ii); for temporary workers and workers exposed to noises at or above the limits given in the Noise-induced Hearing Loss regulations, as stipulated.

Workers in the permanent employ of the Contractor will only be paid for if their certificates require updating.

**C.06 a)** Initial (baseline) medical examinations, including audiometric and lung function testing.

**C.07 Induction Training (Unit (No))**

This item shall cover all costs incurred for the health and safety inductions as set out in Regulation 7 of the Construction regulations and the proof of induction required. Payment will be made on the figures contained in the induction section of the Health and Safety File.

**C.08 Provision of First Aid Boxes. (Unit (No))**

The rate for this item shall cover all costs incurred in the provision and maintaining of first aid boxes.

**C.09 Establishment of noise levels (Unit (No))**

This item shall cover all costs involved in the establishment of noise zones in terms of Regulation 9 of the Noise-induced Hearing Loss Regulations. Where a zone has previously been established for a particular item of plant within the last two years, the test need not be repeated but must be kept valid for the duration of the Contract.

**C.10 Submission of the Health and Safety File. (Lump Sum)**

Expenditure under this item shall be made in accordance with the general conditions of contract.

This amount will be paid only once the Principal Contractor has met all his obligations in respect of the Occupational Health and Safety Act and the Construction Regulations and has submitted his Health and Safety File complete as envisaged on this specification to the Client's satisfaction. This must be done prior to the issue of a Certificate of Completion

## ANNEXURE A

### H&S AGENT AUDIT SHEET EXAMPLE OCCUPATIONAL HEALTH AND SAFETY AUDIT DOCUMENT

<b>PROJECT NAME:</b>	
<b>CONTRACT NUMBER:</b>	
<b>HEALTH AND SAFETY AUDIT No:</b>	
<b>CONDUCTED BY :</b>	
<b>DATE :</b>	

#### EXECUTIVE SUMMARY

#### INTRODUCTION AND OVERVIEW

##### Scoring:

The audit has a scoring schedule, which will be used to deem compliance to what is available on site, and what the appropriate systems need to be to match them. The contractor should aim for a score of 3 on each aspect included in the audit. A low score could result in part or all of the work being stopped until compliance is reached.

<b>Scoring schedule</b>	
If the answer is " <b>No</b> " the rating will be 0	
If the answer is ' <b>not applicable</b> ' it will be noted as n/a	
If the answer is " <b>Yes</b> " the following ratings are applicable	
1	Requirements partially met and no implementation.
2	Requirements partially met and partially implemented
3	Requirements fully met and partially implemented
4	Requirements fully met and fully implemented
5	Requirements and implementation exceeds expectation

#### Key Abbreviations:

Health and Safety	H&S	Driven Machinery Regulations	DMRs
Occupational Health	OH	Regulations for Hazardous Chemical Substances	RHCSs
Construction Regulations	CRs	Pressure Equipment Regulations	PERs
General Safety Regulations	GSRs	General Administration Regulations	GARs
Explosive Regulations	ERs	South African National Standards	SANS
Noise Induced Hearing Loss Regulations	NIHLs	South African Road Traffic Safety Manual	SARTSM
Facilities Regulations	FRs		
South African Bureau of Standards	SABS		
Occupational Health and Safety Act	OHSA		

Provide a summary of site inspection, significant findings of the site inspection and the audit.

**CORE LEGAL RECORDS ON SITE:**

This list is not conclusive – to be updated monthly relative to works in progress. However, the H&S Officer is to be pro-active and pre-empt requirements with the Construction Supervisor (Site Agent). The content will be linked to the physical conditions, processes and activities noted on site, or programme.

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
1.		Updated project <b>H&amp;S Organogram</b>					
2.	OHSA S. 16 (1) and (2)	CEO and subordinate (if required) <ul style="list-style-type: none"> <li>• Proof of Competency provided</li> </ul>					
3.	CR 8 (1) and (2)	Designation of Construction Manager and Subordinate Person(s) <ul style="list-style-type: none"> <li>• Proof of Competency provided</li> </ul>					
4.	OHSA S. 17; GAR 7	<ul style="list-style-type: none"> <li>• H&amp;S Representatives appointed</li> <li>• Monthly inspections completed</li> <li>• Representation from Contractors</li> </ul>					
5.	OHSA S. 18; GAR 5	<ul style="list-style-type: none"> <li>• H&amp;S Committee appointed</li> <li>• Minutes on file</li> <li>• H&amp;S representatives reports discussed</li> <li>• Incidents discussed</li> <li>• Signed by Chair</li> <li>• Evidence of minutes noted</li> </ul>					
6.	GAR 4	Copy of OH&S Act (Act 85 of 1993) available on site					
7.	CR 5(j); 7(c)(iv)	Written proof of registration / <b>Letters of good standing</b>					

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
		available on Site					
8.	OHSA S.37.2	<b>Copy of the Mandatary (S37.2) agreement between the PC and Client</b>					
9.	OHSA S.37.2	<b>Mandatary agreements</b> between PC and contractors					
10.	CR 3(1); 4(1)	<b>Notification to Provincial Director – Annexure 1/2</b> Available on site					
11.	CR 5(1)(m)  7(1)(b)	<ul style="list-style-type: none"> <li>• Copy of Principal Contractor's Health &amp; Safety Plan Available on request.</li> <li>• Letter of approval from Agent.</li> <li>• Health &amp; Safety File opened and kept on site (including all documentation-required in respect of the OHSA &amp; Regulations)</li> <li>• Available at all times</li> </ul>					
12.	CR 7(1)(b)	<b>Copy of Principal Contractor's Health &amp; Safety File provided to Contractors</b> <ul style="list-style-type: none"> <li>• Letters of approval for each contractor on file</li> <li>• List of Contractors on site</li> <li>• Verified monthly by Agent</li> </ul>					
13.		<b>Copies of technical method statements</b> approved by					

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
		Designer <ul style="list-style-type: none"> <li>• Register available, signed by Designer</li> </ul>					
14.	CR 9(1)  OHSA CR 9(3)	<b>Risk Assessments:</b> <ul style="list-style-type: none"> <li>• Up to date and available on site for inspection</li> <li>• Review and monitoring programme adhered to</li> <li>• Workers trained in risk assessments</li> </ul>					
15.	CR9(1)(c)	<b>Safe work procedures Procedure</b> <ul style="list-style-type: none"> <li>• List of available SWPs</li> <li>• Workers trained in SWPs</li> <li>• Proof of training verified</li> </ul>					
16.	OHSA S. 13 CR 7(5)(6)	<b>Induction programme available</b> <ul style="list-style-type: none"> <li>• Proof of <b>induction</b> training available</li> </ul>					
17.	CR 6(1)(2)	<b>Structural information from Designer:</b> <ul style="list-style-type: none"> <li>• Geo-science technical report</li> <li>• Design loading of the structure</li> <li>• Methods &amp; sequence of construction</li> <li>• Design risk assessment</li> <li>• Amended H&amp;S Specification</li> <li>• Temporary Works Design</li> </ul>					

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
18.	CR 12(1)(3)	<b>Temporary Works</b> <ul style="list-style-type: none"> <li>• Appointment of temporary works designer</li> <li>• Proof of Competency provided</li> <li>• Approved temporary works drawings</li> <li>• Temporary work inspection register</li> <li>• Competencies of erectors of temporary works</li> <li>• Construction method statements</li> </ul>					
19.	CR 13(1)(2)	<b>Excavations:</b> <ul style="list-style-type: none"> <li>• Competent persons appointed</li> <li>• CVs available</li> <li>• Depth of excavations on site</li> <li>• Shoring in use</li> <li>• Registers in line with open excavations noted at site inspection</li> </ul>					
20.	CR 13(f) GSR 13A	<b>Ladders:</b> <ul style="list-style-type: none"> <li>• Competent person appointed</li> <li>• Registers kept</li> <li>• Registers for ladders noted on site</li> </ul>					
21.	CR 16(1)	<b>Scaffolding: SANS 10085</b> <ul style="list-style-type: none"> <li>• Competent Erector(s) and Inspector appointed</li> <li>• Proof of Competency provided</li> <li>• Registers in place</li> </ul>					



ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
22	CR 23	<b>Construction Vehicles:</b> <ul style="list-style-type: none"> <li>• Appointment of competent operators</li> <li>• Plant Management:</li> <li>• Registers on file noting daily inspections</li> <li>• Plant and machine lists available</li> <li>• Inadequacies noted on site</li> <li>• Transportation of workers</li> <li>• Registers for sample of vehicles noted on site</li> </ul>					
23	CR 24	<b>Temporary Electrical Installations and Machinery</b> <ul style="list-style-type: none"> <li>• Competent Person appointed</li> <li>• Proof of Competency provided</li> <li>• Updated weekly installation inspection registers in place</li> <li>• Updated daily inspection registers in place</li> </ul>					
24	CR 25	<b>Flammable Liquids:</b> <ul style="list-style-type: none"> <li>• Competent Person appointed for inspections</li> <li>• Proof of Competency provided</li> <li>• Inspection registers in place</li> </ul>					
25	CR 27, ER 6 GSR 8	<b>Housekeeping, Stacking &amp; Storage Supervisor:</b> <ul style="list-style-type: none"> <li>• Appointed per work area</li> <li>• Proof of Competency provided</li> <li>• Include site conditions</li> <li>• Spoil areas</li> </ul>					

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
		<ul style="list-style-type: none"> <li>Register available per area</li> </ul>					
26.	GSR 2	<b>PPE:</b> <ul style="list-style-type: none"> <li>included in Risk Assessment</li> <li>PPE used and enforced</li> <li>Records of Issue kept</li> <li>Training to use (Induction)</li> <li>Registers for condition checks</li> </ul>					
27.	RHCSs CR 7; 23 GSR 4	<b>Hazardous Chemical Use and Storage</b> <ul style="list-style-type: none"> <li>Competent Person/s appointed</li> <li>Proof of Competency provided</li> <li>Risk Assessments include use of HCSs</li> <li>Register of HCS kept/used on Site</li> <li>Flammable Store</li> <li>Bulk diesel storage</li> <li>Material Safety Data Sheets on file and utilised</li> <li>Other</li> </ul>					
28.	GSR 3	<b>Emergency management:</b> <ul style="list-style-type: none"> <li>First aiders available through project</li> <li>Level 1</li> <li>First aid boxes through site</li> <li>Evacuation procedures</li> <li>Registers available (noted on site)</li> </ul>					
29.	GAR	<b>Incident Management:</b> <ul style="list-style-type: none"> <li>Emergency co-ordinator</li> </ul>					

ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
		appointed <ul style="list-style-type: none"> <li>• Proof of Competency provided</li> <li>• Emergency plan appropriate</li> <li>• Emergency level included in Risk Assessments</li> <li>• Workers trained</li> <li>• Incident reports available and complete</li> </ul>					
30.	CR 1 (g), 7(8)	<b>Medical Surveillance Programme</b> <ul style="list-style-type: none"> <li>• All employee records</li> </ul>					
31.	CR 30/ FRs	<b>Welfare Facilities:</b> <ul style="list-style-type: none"> <li>• Toilets available where crews are working/clean</li> <li>• Clean potable water available</li> <li>• Adequate eating facilities</li> </ul>					
32.	SANS 1921-6	<b>HIV AND AIDS PROGRAMME</b> <ul style="list-style-type: none"> <li>• HIV and AIDS Policy and plan available</li> <li>• Condoms available</li> <li>• Peer review programme available</li> <li>• Ongoing training of workers</li> </ul>					
29.		<b>Other</b>					

RESPONSIBILITY	SIGNATURE	DATE
H&S AGENT SIGNATURE:		
PC SIGNATURE:		
DESIGNER SIGNATURE:		
CLIENT SIGNATURE:		

## ANNEXURE B

### CLOSE OUT REQUIREMENTS

The H&S files for the Principal Contractors and all Contractors require closure and handover to the Client at the completion of the project. The following list is an example of what should be included but is not exhaustive. The OHS Agent or the Client may require further information at the time of completion and the Principal Contractor is to ensure that all instructions are met. Documentation would include all records from the start of the project. Daily or monthly plant inspection records are not required unless they are related to an accident. All records to be in electronic format and submitted to the OHS agent for approval in adequately formatted lists and folders. Layout should be logical and in the same order as in the site files.

#### Health and Safety close out file requirements include:

- a) Client H&S Specification
- b) Principal Contractor's OHS Plan(s)
- c) Organograms
- d) Legal Appointments
- e) List of all employees employed on a permanent or contractual basis over the duration of the contract
- f) Notification to Department of Labour of commencement of work
- g) Letters of Good Standing for the Project
- h) Full files for all Contractors as well as their close out reports
  - List of Contractors
  - All employees employed on a permanent or contractual basis over the duration of the contract
  - Letters of Approval of Contractors
  - Mandatary Agreements
  - Letters of Good Standing
  - Appointments
- i) Incident Records
- j) Non- Conformance records
- k) Agent's Audits
- l) Method Statements
- m) Risk assessments
- n) Safe work procedures
- o) Medical surveillance certificates of fitness. Medical records are to be kept according to the OH&S Act as amended
- p) All drawings for temporary structures (suspended beams/scaffolds etc)
- q) All operating manuals for any systems that require ongoing maintenance
- r) Copies of test results, policies and procedures for environmental monitoring (silica, noise, dusts etc.)

#### Defect and Liability Period

The H&S files are to be kept 'live' for the defect and liability period by the Principal Contractor, including those of their Contractors. Any work required during the defect and liability period will require an assessment of the H&S file by the OH&S Agent prior to any work commencing.

A copy drawing records for the as-builts are to be placed on file by the Designers once complete.

## ANNEXURE C

### NON CONFORMANCES

HEALTH AND SAFETY SITE INSPECTION NON CONFORMANCE NO		
<b>AGENT:</b>	<b>PROJECT:</b>	
<b>Consultant:</b>	<b>Date and time:</b>	
<b>Client</b>	<b>Area:</b>	
<b>Contractor:</b>		
<b>ASPECTS NOTED:</b>	<b>COMMENTS:</b>	<b>COMPLETION REQUIRED BY (DATE):</b>
	•	
	•	
	•	
	•	
	•	
<b>PHOTOGRAPHIC EVIDENCE (if available):</b>		
<b>OTHER:</b>		
The following penalties are to be applied:		
<b>Signature of Designer</b>		
<b>Signature of H&amp;S Officer/Site Agent</b>		
<b>Signature: of H&amp;S Agent</b>		

## ANNEXURE D:

### CONTRACTORS MONTHLY HEALTH AND SAFETY REPORT

(To be submitted by the end of the first week of each month and be available with each audit)

	CONTRACT NUMBER:	PROJECT NAME:	CONTRACT DETAILS:
<b>1</b>	<b>GENERAL ACTIVITIES FOR THE MONTH</b>  (detail each area of work)		
<b>2</b>	<b>NUMBER OF WORKERS</b> (permanent and local, contractors)		
<b>3</b>	<b>TRAINING DONE</b> (supplier, no of people, type)		
<b>4</b>	<b>INCIDENTS / ACCIDENT</b> (list number and details, attach reports)		
<b>6</b>	<b>NON-CONFORMANCES</b> (closed out or active)		
<b>7</b>	<b>CONTRACTORS</b> (list, approval status)		
<b>8</b>	<b>AUDITS COMPLETED</b> (internal and external)		
<b>9</b>	<b>CRITICAL ISSUES</b>		

10	GENERAL	

H&S Officer \_\_\_\_\_ Signature \_\_\_\_\_ Date: \_\_\_\_\_  
Site Agent \_\_\_\_\_ Signature \_\_\_\_\_ Date: \_\_\_\_\_



**ANNEXURE E  
RISK ASSESSMENT FORMAT**

<b>ACTIVITY</b>		<b>RA No.</b>		<b>Rev No.</b>	
<b>CONTRACT</b>		<b>DATE WRITTEN</b>		<b>REVIEW DATE</b>	
	<b>WRITTEN BY</b>		<b>REVIEWED BY</b>		<b>APPROVED BY</b>
<b>NAME</b>					
<b>SIGNATURE</b>					

RISK REF	ACTIVITY	POTENTIAL HAZARD	RISK	S	H	E	RISK EVALUATION	PURE RISK	CONTROLS MITIGATION	EFFECTIVENESS OF CONTROLS	RESIDUAL RISK	RESIDUAL RISK RANKING
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**Severity Criteria**

Weight No	Hazard Description	Environment	Safety/Health
16	Catastrophic	Irreversible ecological damage	Multiple fatalities due to injury or occupational disease
8	Major	Reversible ecological damage with potential long term impact	Fatality or number of disabilities/disabling diseases
4	Moderate	Ecological disturbance, can be rehabilitated	Disabling injury or occupational illness
2	Minor	Short-term ecological impact. Requires intervention	Minor injuries or exposure requiring medical attention
1	Insignificant	Low impact, natural rehabilitation	First Aid treatment required

**Frequency Criteria**

Weight No	Hazard Description	Frequency
1	Rare	Less than once every 2 years
2	Infrequent	Every 1-5 years
3	Frequent	Multiple times per year
4	Often	Monthly
5	Consistent	Weekly/Daily

**Exposure Criteria**

Weight No	Hazard Description	Environmental Exposure	Safety/Health Exposure
1	Minimal	Incident site	A few of the workforce minimal time
2	Restricted	Localised	A few of the workforce, some of the time/some of the workforce minimal time
3	Local	Construction Site Wide	Some of the workforce, some of the time
4	Widespread	Immediate neighbours	Most of the workforce, some of the time/some of the workforce most of the time
5	Extensive	Community exposure	Most of the workforce, most of the time

**ANNEXURE F:****TYPICAL BILL OF QUANTITIES FOR OCCUPATIONAL HEALTH AND SAFETY**

ITEM NO	DESCRIPTION	UNIT	QUANTITY	RATE	TOTAL
C.01	Preparation of the Contractor's site specific Health and Safety Plan	lump sum			
C.02	Principal Contractor's initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations	lump sum			
C.03	Principal Contractor's time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations	month			
C.04	Provision of Personal Protective Equipment (PPE)				
	(a) Reflective vests	No			
	(b) Hard hats	No			
	(c) Protective foot wear	No			
	(d) Earplugs	No			
	(e) Dust masks	No			
	(f) Gloves				
	(h) Ear Defenders SABS approved	No			
C.05	Provision of a full time Construction Health and Safety Officer	month			
C.06	Cost of medical certificates and medical surveillance				

	(a) Initial (baseline) medical examinations	prime cost (PC) sum			
	(b) Periodic and exit examinations	prime cost (PC) sum			
	(c) Contractor's charges to allow for handling costs and profit in respect of sub items 13/X.06 (a) and (b)	%			
C.07	Induction training	No			
C.08	Provision of First Aid Boxes to GSR requirements	No			
C.09	Noise monitoring				
	(a) Establishment of noise zones (plant)	No			
	(b) Audiograms (personnel)	No			
C.10	Submission of a Health and Safety File	lump sum			

## ANNEXURE G

### HARRY GWALA DISTRICT MUNICIPALITY

#### HEALTH AND SAFETY (H&S) PRE-TENDER REPORT

Tenderers are required to submit a pre-tender H&S plan with their Tender submission.

The following requirements were set in the tender documentation and have been utilized to assess the completeness of the documentation presented with the submission of tenders. These requirements fulfil the requirements of the Client in terms of the Construction Regulations, Regulation 5(1)(h). They are to be read in addition to the Act and Regulations but are not a substitute for them.

The documentation submitted will be used to assess the competence of the tenderer, as required in the CRs, therefore the information submitted needs to be complete and as close as possible to the final product.

The following scores have been used to determine compliance with the pre-tender requirements:  
Scoring as follows:

<b>Not supplied or not adequate</b>	<b>0</b>
<b>Supplied and complete</b>	<b>1</b>

If the tenderer has not completed any projects then Items 4 and 5 need not be supplied. A letter to this effect must be attached.

***Tenderers are required to achieve a minimum of 10 out of a total of 17 for their tenders to be considered.***

Legal or Specification Reference	Pre-Tender Requirement H&S	Tenderers Response	Max Score	Actual Score
Construction Regulations (CRs) 7(1)	1. A project specific H&S Plan in line with this project specification which will support the CRs, therefore the information submitted needs to be complete and as close as possible to the final product. See check sheet		1	
CRs 5(1)(g)	2. Adequate pricing for H&S is also required, and the appropriate section in the BoQ is to be completed. Failure to do so could result in the Tender being regarded as non-responsive.		1	
CRs 5(1)(h)	3. A declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2014;		1	

	4. At least one copy of minutes of previous Occupational Health and Safety Committee meetings;		1	
	5. Incident Investigation Reports for other projects of a similar nature undertaken by the tenderer		1	
CRs 9(1)(b)	6. Detailed technical method statements for approval by the ER and for approval by the H&S Agent:  a. Site establishment; b. Clearing and grubbing; c. Construction of offices and accommodation, and d. Proposed site layouts		1 1 1 1	
CRs 9(1)	7. Appropriate risk assessments:  a. Site establishment; b. Clearing and grubbing; c. Construction of offices and accommodation, and d. Proposed site layout		1 1 1 1	
CR 9(1)	8. Appropriate safe work procedures a. Site establishment; b. Clearing and grubbing; c. Construction of offices and accommodation, and d. Proposed site layouts		1 1 1 1	
	<b>FINAL SCORE</b>		<b>17</b>	

**ANNEXURE H****TENDER STAGE OHS PLAN EVALUATION**

Tenderers will be scored on their response to various facets of the Health and Safety Specification in the Tender Document. Failure to achieve a score of 60 % will render the tender non-responsive				
Proof of the evaluation must be given under the remarks column				
1	<b>General</b>	Is the Specification Project Specific? If not then score is 0.		
	<b>Scoring</b>	Response present and satisfactory	1	
		Not present	0	
<b>OHS Act/regulation</b>	<b>Specification Section</b>	<b>Description</b>	<b>Max Score</b>	<b>Score</b>
8(1)	6.1.4	Construction supervisor	1	
8(6)	6.1.5	Construction Health and Safety Officer	1	
	7.1	Health Risks and Medical Surveillance		
NIHLR	7.2	Noise Risks	1	
	7.3	Emergency Procedures		
GSR 3	7.4	First Aiders and First Aid Equipment	1	
CR 27	8	Fires and Emergency Management	1	
GAR 8	7.6	Incident Management and Compensation Claims	1	
GSR 2	7.7	Personal Protective Equipment (PPE) and clothing	1	
GSR 2B	7.8	Occupational Health and Safety Signage	1	
CR 7 (5)(6)	7.9	Induction of Employees and Visitors, General H&S Training	1	
CR 23	7.10	Management of plant and equipment	1	
CR13	7.11	Excavations	1	
CR 10	7.12	Working at Heights	1	
CR 8	7.12	Fall protection plan	1	
CR 24	7.13	Cranes and lifting equipment	1	
CR 12	7.15	Temporary works	1	
CR5(1)(0)	7.18	Auditing	1	
DMR/GMR	7.19	Mechanical installations	1	
OHSA 8(2)(j)	7.20	Communication on Site	1	
CR 30	7.21	Care of Workers on Site (Welfare)	1	
	Additional requirements			
	6.1.3	Declaration of competency	1	
Cr 9 (1)		Method statements (SWPs)		
		a) Site Establishment	1	
CR5(1)(g)		Has pricing for OHS been allowed for?	1	
		<b>TOTAL SCORE</b>	24	
		<b>TOTAL PERCENTAGE</b>		

If a section is not applicable, then it must be deleted from the score sheet and the total score reduced.

## ANNEXURE I

### AGREEMENT IN TERMS SECTION 37.2 OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993 (ACT NO. 85 OF 1993)

THIS AGREEMENT is made at \_\_\_\_\_ on this the \_\_\_\_\_ day of \_\_\_\_\_ in the year \_\_\_\_\_ between HARRY GWALA DISTRICT MUNICIPALITY (*hereinafter called "the Client"*) of the one part, herein represented by \_\_\_\_\_ in his capacity as \_\_\_\_\_ and delegate of the Client in terms of the Client's standard powers of delegation.

and

\_\_\_\_\_ (*hereinafter called "the Mandatary"*) of the other part, herein represented by

\_\_\_\_\_ in his capacity as \_\_\_\_\_

and being duly authorised by virtue of a resolution appended hereto as Annexure A.

WHEREAS the Client is desirous that certain works be constructed, viz **CONTRACT NO.** \_\_\_\_\_, and has accepted a tender by the Mandatary for the construction, completion & maintenance of such works and whereas the Client and the Mandatary have agreed to certain arrangements and procedures to be followed in order to ensure compliance by the Mandatary with the provisions of the Occupational Health and Safety Act 1993 (Act 85 of 1993 as updated);

#### NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS:

- 1 The Mandatary shall execute the work in accordance with the contract documents pertaining to this contract;
- 2 This Agreement shall hold good from its commencement date, which shall be the date determined in terms of the Form of Offer and Acceptance, or other date decided upon, in the Contract Data, to either;
  - a) The date of the final certificate issued or as contained in this Volume \_\_\_\_\_ of the contract documents pertaining to this Contract, or
  - b) The date of termination of the Contract;
- 3 The Mandatary declares himself to be conversant with the following:
  - a) All the requirements, regulations and standards of the Occupational Health and Safety Act (Act 85 of 1993 as updated), hereinafter referred to as "The Act", together with its amendments and with special reference to the following Sections of The Act.
    - i. Section 8: General duties of clients to their employees;



- ii. Section 9: General duties of clients and self-employed persons to persons other than employees;
  - iii. Section 10: General duties of manufacturers and others regarding articles and substances for use at work;
  - iv. Section 37: Acts or omissions by employees or Mandatories, and
  - v. Sub-section 37(2) relating to the purpose and meaning of this Agreement.
- b) The Contractor shall ensure that he familiarises himself with the requirements of the Clients health and safety specification developed for the project, and that he, his employees and any other Contractors employed during the project comply with them. The Contractor shall ensure that all health and safety documentation required as part of the health and safety plan is maintained for the duration of the project.
- 4 In addition to the requirements of conditions of contract (as amended by the Contract Data of the contract documents pertaining to this Contract), the Mandatary agrees to execute all the works forming part of this Contract and to operate and utilize all machinery, plant and equipment in accordance with The Act.
- 5 The Mandatary is responsible for the compliance with the Act by all his Contractors, whether or not selected and/or approved by the Client.
6. The Mandatary warrants that all his own and his Contractors' workmen are covered in terms of the Compensation for Occupational Injuries and Diseases Act 1993 as amended, which cover shall remain in force whilst any such workmen are present on site. A letter of good standing from the Compensation Commissioner to this effect must be produced to the Client upon signature of the agreement.
7. The Mandatary undertakes to ensure that he and/or subcontractors and/or their respective clients will at all times comply with the following conditions:
- a) The Mandatary shall assume the responsibility in terms of Section 16.1 of the Occupational Health and Safety Act. The Mandatary shall not delegate any duty in terms of Section 16.2 of this Act without the prior written approval of the Client. If the Mandatary obtains such approval and delegates any duty in terms of section 16.2 a copy of such written delegation shall immediately be forwarded to the Client.
  - b) All incidents referred to in the Occupational Health and Safety Act shall be reported by the Mandatary to the Department of Labour as well as to the Client. The Client must further be provided with copies of all written documentation relating to any incident.
  - c) The Client hereby obtains an interest in the issue of any formal enquiry conducted in terms of section 32 of the Occupational Health and Safety Act into any incident involving the Mandatary and/or his employees and/or his Contractors.
  - d) The Mandatary shall conduct such risk assessments, method statements and safe work practices as may be necessary during the course of the contract and shall ensure that all staff are informed of these. Proof of this shall be placed in the project Health and Safety file.
  - e) Adherence to the Contractor's Health and Safety plan must be enforced including the application of penalties for non-conformance as set out in the Client's Health and Safety Specification.

In witness thereof the parties hereto have set their signatures hereon in the presence of the subscribing witnesses:

**SIGNED FOR AND ON BEHALF OF THE CLIENT:-** \_\_\_\_\_

**WITNESS SIGNED:-** 1. \_\_\_\_\_ 2. \_\_\_\_\_

**NAME (IN CAPITALS) 1.** \_\_\_\_\_ **2.** \_\_\_\_\_

**SIGNED FOR AND ON BEHALF OF THE MANDATARY:-** \_\_\_\_\_

**WITNESS SIGNED:-** 1. \_\_\_\_\_ 2. \_\_\_\_\_

**NAME (IN CAPITALS) 1.** \_\_\_\_\_ **2.** \_\_\_\_\_

# HARRY GWALA DISTRICT MUNICIPALITY



## CREIGHTON WATER SUPPLY SCHEME

UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM  
1ML/DAY TO 5ML/DAY

CONTRACT No. HGDM 821/HGDM/2022

**PART C3  
ENGINEER'S QUALITY MANAGEMENT  
SPECIFICATION**

## 1. INTRODUCTION

HGDM subscribes to a Quality Management System accredited by a number of certification bodies including ISO 9001.

This document/specification summarises the Quality Control Procedures used by the Contractor in the Quality Assurance and Control on site works. These procedures are to be used by Engineer's Representative Staff (i.e. ER and his assistants) and the Contractor's staff on the following commonly encountered sites;

- Pipelines
  - UPVC Pipelines
  - HDPE Pipelines
- Building Works

The procedures have been developed as "intellectual" property of Harry Gwala District Municipality and may only be used on sites managed by Zimile Consulting Engineers. Any other use is subject to consent/agreement with Harry Gwala District Municipality and Zimile Consulting Engineers.

All references to approval by ER require that the Contractor (via the Site Agent) initiates the necessary request for approval). In addition, the Contractor will be required to maintain a copy of all records as required by this Specification.

The application of the procedures will be agreed as appropriate between the Contractor's Site Agent and the Engineer (or his Representative) at the commencement of construction activities.

***It will be deemed that the Contractor has incorporated in his completion period and pricing, the necessary requirements to comply with this Specification fully.***

### 1.1 Elements of Site Quality Assurance

The elements of Site Quality Assurance comprise the following:

- general elements that apply to all sites and
- site specific elements that are specific to sites and may be dependent on the type of construction.

## 2. GENERAL ELEMENTS APPLICABLE TO ALL SITES

### 2.1 Construction Quality Control Organization

This section presents the requirements of key site personnel involved on construction sites, i.e. Engineer's Representative (ER) staff and Contractor's staff. The following quality assurance procedures for site quality assurance personnel should be followed:

### 2.1.1 Engineer's Quality Assurance Personnel

The following ER staff appointments' procedure should be followed to ensure the right superintendence on contracts:

Item	Activity	Remarks	Responsible Party	Approval by
1	Appointment of Engineer for contracts	Stated in contract data	Engineer	Employer
2	Supervision staffing arrangements	Proposed prior to construction work	Engineer	Employer
3	Site staff	Proposal for site personnel including CV's	Engineer	Employer
4	Roles	Delegation of powers by Engineer	Engineer	Engineer

The site staff will comprise the Engineer's Representative (ER) and ER's assistants (Field Officers):

#### (a) Engineer's Representative (ER)

The ER is the primary point of contact for the Engineer on all construction management issues. The ER will monitor and approve each contractor's quality submittal to ensure that the project is meeting the specifications and requirements. The ER will manage the implementation of the CQAP at the project sites with assistance from Field Officers appointed by the Engineer.

#### (b) ER Assistants/Field Officers (FO's)

Field Officers (FOs) are responsible to the ER and support the ER's management of the CQAP. The FOs will monitor the day-to-day activities of the contractor. This includes ensuring that contractors comply with the drawings and specifications, applicable SABS standards, good workmanship, and the CQC requirements. As part of this effort, FOs will:

- conduct independent inspections to verify the quality of the work;
- participate in contractor inspections;
- review test and inspection reports; and
- ensure that the required documentation is submitted.

The FOs will be alerted to detect, record, and report any deviation from the contract documents, including calling any deficient item to the attention of the ER and the contractors' Site Agents. The FOs will keep accurate and detailed records of the contractor's performance and progress, delivery of materials, and other pertinent matters, including the daily inspection report.

## 2.2 Contractor's Quality Assurance Personnel

The contractors are responsible for the quality control of their constructed work product as well as the necessary inspections and tests required to ensure that their work complies with the contract documents.

### 2.2.1 Contractor's Site Staff

The contractors' Site Agents are the primary point of contact for the Contractors on all construction management issues. The Site Agents must be full-time on site for the contractors. The Site Agents must have full authority to institute any and all actions necessary for the successful implementation of the CQC program to ensure compliance with the drawings and technical specifications.

The following procedures apply with respect to appointment of the contractor's key personnel:

Aspect	Remarks	Approval By	When
Appointment of Site Agent	As per tender for quality based evaluated tenders	Engineer	Prior to commencement of construction
Appointment of Site Forepersons	As per tender for quality based evaluated tenders	Engineer	Prior to commencement of construction

## 2.3 Site Establishment

The Engineer's Representative shall inspect and approve/disapprove contractor's site establishment using Quality Procedure Form QC 01.

## 2.4 General

For all projects the ER must undertake the following general items as appropriate:

1	Confirm "Permission to Occupy" has been received from the relevant authority.
2	"Handover of Site" to Contractor to be confirmed in writing.
3	Inspect and approve Site Establishment (Form QC 01).
4	Setup Site Files/Filing System.
5	Ensure a copy of the Contract Document is retained on Site by the Contractor.
6	Ensure a full set/s of approved drawings is/are retained on Site by the Contractor.

7	Maintain a Drawing Register.
8	Ensure a copy of the latest Contract Program is clearly displayed on Site.
9	Establish Quality Assurance Procedures and carry out inspections as and when required.
10	Issue Site Instructions as and when required.
11	Ensure Safety File, including Dept. of Labour notification, is up to date and on Site and all relevant regulations, including issuing of PPE, are strictly adhered to.
12	Ensure all relevant information is recorded in a daily Site Diary and counter signed.
13	Hold regular Work Meetings with the Contractor.
14	Hold regular Site Meetings with the Client, Professional Team and the Contractor.
15	Maintain a copy of the Environmental Record of Decision on Site

### 3. SITE SPECIFIC QUALITY ASSURANCE PROCEDURES

Quality assurance inspections and testing will be used to verify the adequacy and effectiveness of the contractor's quality control program. The Engineer's Quality Assurance Personnel detailed above will provide inspection and supervision within the scope of work, which includes monitoring of the following construction activities:

- Manufacture of materials
- Transporting and off-loading and storage of construction materials
- Inspection of construction activities, including:
  - Pipework
    - uPVC
    - HDPE
  - Building Works

The Contractor will be required to formally request for inspection for any activity which he deems to be complete before proceeding to the next stage of the whole operation. Formal requests must be filled in the **relevant QC** Form.

#### 3.1 Contractor Deficiency Correction

When material, performed work or installation is found to be deficient and/or does not meet the project specifications, the Engineer's QA personnel will assure deficiency correction is implemented. In addition to results of an inspection being recorded on the relevant **QC Form**, in the event of inspection failure, the Engineer's QA personnel will fill in **Form QC 008** "Failure Report", to record the deficiencies. A copy of this report will be handed over to

the Contractor's Site Agent. The Contractor will implement corrective actions to remedy work that is not in accordance with the drawings and specifications. The corrective actions will include removal and replacement of deficient work using methods approved by the ER. Removal must be done in a manner that does not disturb work that meets QC/QA criteria; otherwise, the disturbed material must also be removed and replaced. Replacement must be done in accordance with the corresponding technical specifications. Replacement will be subjected to the same scope of QC/QA inspection and testing as the original work. If the replacement work is not in accordance with the drawings and specifications, the replacement work will be removed, replaced, re inspected and re-tested.

Activities which specifically require approval before the next stage can proceed are as detailed in this section.

### 3.1 Pipework

The following procedures will be used for pipework quality assurance:

#### 3.1.1 uPVC Pipework

The ER is responsible for ensuring the following quality assurance procedure is followed, **as a minimum**:

1	Inspect & Approve Setting Out (Form QC 001).
2	Inspect & Approve Pipeline Trenches (Form QC 002).
3	Inspect & Approve Pipeline Bedding (Form QC 003).
4	Inspect & Approve Pipe Installation – PVC (Form QC 004B).
5	Inspect & Approve Pipeline Pressure Testing (Form QC 006).
6	Inspect & Approve Backfilling to Trenches (Form QC 007).

Copies of the QC's forms are available for inspection at the offices of Zimile Consulting Engineers.

#### 3.1.2 Steel Pipework

The ER is responsible for ensuring the following quality assurance procedure is followed, **as a minimum**:

Copies of the QC's forms are available for inspection at the offices of Zimile Consulting Engineers.

1	Inspect & Approve Setting Out (Form QC 001).
2	Inspect & Approve Pipeline Trenches (Form QC 002).
3	Inspect & Approve Pipeline Bedding (Form QC 003).
4	Inspect & Approve Pipe Installation – Steel (Form QC 004A).
5	Inspect & Approve Welding of Pipes (Form QC 005).
6	Inspect & Approve Pipeline Pressure Testing (Form QC 006).
7	Inspect & Approve Backfilling to Trenches (Form QC 007).



### 3.2 Reinforced Concrete Works

The ER is responsible for ensuring the following quality assurance procedure is followed, **as a minimum**:

1	Inspect & Approve Setting Out (Form QC 001).
2	Inspect & Approve Excavations (Form QC 008).
3	Inspect & Approve Backfilling to Excavations (Form QC 009).
4	Inspect & Approve Excavations prior to Blinding (Form QC 010).
5	Inspect & Approve Cast Concrete (Form QC 016).
6	Inspect & Approve Structure prior to Concreting (Form QC 015).
7	Inspect & Approve Cast Concrete (Form QC 016).
8	Inspect & Approve Backfilling to Excavations (Form QC 009).

Copies of the QC's forms are available for inspection at the offices of Zimile Consulting Engineers.

### 3.3 Building Works

The ER is responsible for ensuring the following quality assurance procedure is followed, **as a minimum**:

1	Inspect & Approve Setting Out (Form QC 001).
2	Inspect & Approve Excavations (Form QC 008).
3	Inspect & Approve Backfilling to Excavations (Form QC 009).
4	Inspect & Approve Excavations prior to Blinding (Form QC 010).
5	Inspect & Approve Cast Concrete (Form QC 016).
6	Inspect & Approve Foundations prior to Concreting (Form QC 011).
7	Inspect & Approve Cast Concrete (Form QC 016).
8	Inspect & Approve Sub Structure Brickwork (Form QC 012).
9	Inspect & Approve Foundations prior to Surface Bed Concreting (Form QC 013).
10	Inspect & Approve Cast Concrete (Form QC 016).
11	Inspect & Approve Superstructure Brickwork (Form QC 014).
12	Ensure relevant Certificates are received/issued for the roof structure.

Copies of the QC's forms are available for inspection at the offices of Zimile Consulting Engineers.

### 3.4 Roadworks

The ER is responsible for ensuring the following quality assurance procedure is followed, **as a minimum**:

1	Inspect & Approve Setting Out (Form QC 001).
2	Inspect & Approve Excavations (Form QC 008).
3	Inspect & Approve Backfilling to Excavations (Form QC 009).
4	Inspect & Approve Excavations prior to Blinding (Form QC 010).
5	Inspect & Approve Earthworks (Form QC 017).
6	Inspect & Approve Subgrade Construction (Form QC 018).
7	Inspect & Approve Pavement Layerworks/Subbase (Form QC 019).
8	Inspect & Approve Base Construction (Form QC 020).
9	Inspect & Approve Culvert Construction (Form QC 021).
10	Inspect & Approve Headwalls and Wing Walls (Form QC 024).
11	Inspect & Approve Subsoil Drainage (Form QC 023).
12	Record Site Measurement (Form QC 025)

Copies of the QC's forms are available for inspection at the offices of Zimile Consulting Engineers.

## 4 DOCUMENTATION

### 4.1 Overview

An effective CQA Plan depends largely on recognition of all construction activities that should be monitored and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The ER will document that quality assurance requirements have been addressed and satisfied. The ER will provide the Engineer with signed descriptive remarks, data sheets, and inspection reports to verify that monitoring activities have been carried out. The ER will also maintain, at the job site, a complete file of Drawings and Technical Specifications, a CQA Plan, test procedures, daily diaries, and other pertinent documents.

### 4.2 Daily Site Diary

A daily construction site diary will be prepared and signed by each Site Agent and the ER. The diary will include a summary of the contractor's daily construction activities. At a minimum, the daily construction diary will include the following information:

- Date, project name, location, and other identification
- Description of weather conditions, including temperature, cloud cover, and rainfall
- Reports on any meetings held and their results
- Record of visitors to site

- Locations of construction underway during that day
- Equipment and personnel working in each activity, including subcontractors
- Descriptions of work being inspected
- Decisions made regarding approval of units of material or of work, and corrective actions to be taken
- Description of problems or delays and resolution
- Communications with contractor staff
- Construction activities completed and/or in progress
- Signature of the diary preparer

The daily site diary will be routed on a daily basis to the project QC/QA files and will be maintained as part of the permanent project record.

#### **4.3 Control of Quality Records**

The ER verifies QA record accuracy and maintains copies of all quality-related documentation. This includes, but may not be limited to:

- Daily construction QA records;
- Inspection reports;
- Non-conformance (Failure) reports;
- Material receiving reports; and
- Monitoring and test data.

These records will be stored in files maintained in the project document control files. All original documents pertaining to QC information will be maintained in the project file located at the site. All records shall be available for inspection and audit, at any time, by the Engineer and the Employer.

## CREIGHTON WATER SUPPLY SCHEME

### CONTRACT No. HGDM 821/HGDM/2022

#### UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

#### PART C4: SITE INFORMATION

#### INDEX

<b>PART C4: SITE INFORMATION</b> .....	<b>2</b>
C4.1 LOCALITY PLAN .....	2
C4.1.1 Access .....	2
C4.2 CONDITIONS ON SITE .....	2
C4.2.1 Nature of Ground and Subsoil Conditions .....	2
C4.2.2 Weather Conditions .....	2
C4.2.3 Limitations .....	3
C4.2 GEOTECHNICAL REPORT .....	3
C4.3 ENVIRONMENTAL .....	4

## PART C4: SITE INFORMATION

### C4.1 LOCALITY PLAN

The Locality of the site is as per the attached Locality Plan.

#### C4.1.1 Access

- 1.1 The Creighton Bulk Water Supply Scheme's Creighton is located on P8-3, Connected to the main road R612 via P122 at Mabelana area. The turn-off at Mabelana is located approximately 45-minutes South-West from Pietermaritzburg or, 15 minutes West of Ixopo. Co-ordinates:

30o01'53.5" S; 29o48'44.7" E [Creighton Town Reservoir]

30° 1'2.96"S; 29°43'22.99"E [Centocow Water Treatment Plant]

30°00'41.4" S; 29°43'47.5" E [Abstraction Works]

Creighton is a multi-year bulk water supply project whose main purpose is to supply Creighton Town, a small town with an already on-going recorded agri-industrial growth potential whose water demands have rendered current existing infrastructure insufficient. Project capacity has been augmented to also supply areas near Centocow.

### C4.2 CONDITIONS ON SITE

A brief description of the site conditions is given under this section.

#### C4.2.1 Nature of Ground and Subsoil Conditions

No subsoil investigations have been carried out on this site. The employer will not be held accountable for any assumptions that tenderers may make in pricing based on their visual inspection of the site during the tender briefing meeting. Tenderers must satisfy themselves as to the nature of materials to be excavated under this contract.

#### C4.2.2 Weather Conditions

Table C4.2.1: Expected Number of Working Days Lost per Month due to Normal Rainfall

Month	Expected number of working days lost as result of normal rainfall - "n"
January	5
February	5
March	4
April	1
May	1
June	1
July	1

August	1
September	2
October	3
November	4
December	5
<b>TOTAL</b>	<b>33 days</b>

*(The number of working days lost for December and January exclude the rain days for the annual year end shut down period as recommended by SAFCEC.*

During the execution of the Works, the Engineer's Representative will certify a day lost due to abnormal rainfall and adverse weather conditions only:

- if rain on site exceeded 10 mm over 24 hours.
- if no work was possible on the relevant working day on any item which is on the critical path according to the latest approved construction programme; or
- if less than 30% of the work force and plant on site could work during that specific working day.

Extension of time as a result of abnormal rainfall and adverse weather conditions shall be calculated monthly being equal to the number of working days certified by the Engineer's Representative as lost due to rainfall and adverse weather conditions, less the number of days allowed for as in Table C4.2.1, which could result in a negative figure for certain months. The total extension of time as a result of abnormal climatic conditions, 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.

#### C4.2.3 Limitations

The following limitations characterise the site of the pipeline construction

- Extra care will have to be exercised with regards the activities of the Contractor's labour while they are on site to ensure that there is no undue damage to private property as a result of construction activities.
- The Contractor will be required to ensure that the insurances for the works cover any damage that may occur to private properties as a result of construction activities. Should there be any claims against the contractor resulting from construction activities, the Engineer will ensure that these have been addressed or the damages rectified prior to the release of the retention held on the contract.

#### C4.2 GEOTECHNICAL REPORT

Tenderers must satisfy themselves as to the nature of materials to be excavated under this contract.

No responsibility is accepted for any conclusions drawn by Tenderers from the results and information supplied (if any) and Tenderers must satisfy themselves as to the nature of materials to be excavated

under this contract. Tenderers are at liberty to excavate any further trial holes or to carry out other investigations to satisfy themselves as to the nature of the ground that will be encountered in carrying out the Works, provided that they advise the Engineer of their intention to carry out such further trial hole excavations or other investigations so that the necessary safety requirements can be ensured. Any trial hole excavated in areas close to pedestrian or vehicular traffic 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 whatsoever arising out of, or as a consequence of, carrying out trial hole excavations for the purpose of his 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.

### **C4.3 ENVIRONMENTAL**

The Contractor will be responsible for environmental control on site during construction and the maintenance period. The construction activities will be monitored by an independent environmental specialist.

HARRY GWALA DISTRICT MUNICIPALITY

CREIGHTON WATER SUPPLY SCHEME: UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

CONTRACT HGDM821/HGDM/2022

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## CREIGHTON WATER SUPPLY SCHEME

CONTRACT No. HGDM 821/HGDM/2022

UPGRADING OF THE CENTOCOW WATER TREATMENT WORKS FROM 1ML/DAY TO 5ML/DAY

### PART C5: DRAWINGS

#### INDEX

PART C5: DRAWING.....D1