

# HARRY GWALA DISTRICT MUNICIPALITY



## RAISING OF KEMPSDALE DAM

### INVITATION TO TENDER FOR APPOINTMENT OF A SERVICE PROVIDER FOR THE CONSTRUCTION OF KEMPSDALE DAM WALL

**CONTRACT No. HGDM 823/HGDM/2022**

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

**COMPILED BY:**

Zimile Consulting Engineers  
76 Hope Street  
Kokstad  
4700  
Tel N<sup>o</sup>: +27 39 940 6729  
Fax N<sup>o</sup>: N/A  
Email: info@zimile.co.za

**ON BEHALF OF:**

Harry Gwala District Municipality  
Private Bag X 501  
IXOPO  
3276  
Tel N<sup>o</sup>: +27 39 834 8700  
Fax N<sup>o</sup>: +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"/>

**RAISING OF KEMPSDALE DAM****CONSTRUCTION OF KEMPSDALE DAM WALL****CONTRACT N<sup>o</sup> HGDM 823/HGDM/2022****TABLE OF CONTENTS**

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T1.2	Tender Data	Pink	TP5 to TP29
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T2.2	List of Returnable Documents and Schedules	Yellow	RD68 to RD84
<b>PART C1: AGREEMENTS AND CONTRACT DATA</b>			<b>C 1 to C 21</b>
C1.1	Form Offer and Acceptance	Yellow	C2
C1.2	Contract Data	Yellow	C7
C1.3	Performance Guarantee	Yellow	C12
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C1.5	Agreement in terms of the Occupational Health and Safety Act No. 85 of 1993	Yellow	C16
C1.6	Adjudication Board Member Agreement	Yellow	C19
<b>PART C2: PRICING DATA</b>			<b>PD 1 to PD 6</b>
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C2.2	Schedule of Quantities	Yellow	PD6
<b>PART C3: SCOPE OF WORK</b>			<b>SW 1 to SW 219</b>
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**CONTRACT N° HGDM823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**PART T1: TENDERING PROCEDURES**

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<b>T1.1 TENDER NOTICE AND INVITATION TO TENDER</b>
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**HARRY GWALA DISTRICT MUNICIPALITY  
INFRASTRUCTURE SERVICES DEPARTMENT**

**BID NOTICE**

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.	CONSTRUCTION OF KEMPSDALE DAM WALL	8CE OR HIGHER	31 October 2023 at 10:00am at Greater Kokstad Municipality Council Chamber. Then proceed to site.	Contract No. HGDM823/HGDM/2022	20 November 2023 @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. <u>Ownership</u></b>	<b><u>Verification Method</u></b>	<b><u>Weighting</u></b>
<ul style="list-style-type: none"> <li>Black Ownership ≥ 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. <u>Locality</u></b>	<b><u>Verification Method</u></b>	<b><u>Weighting</u></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 above-mentioned projects will be issued upon a non-refundable cash payment of **R1000.00** each per project respectively.

**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**

**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.

<b>CLAUSE No</b>	
<b>F.1</b>	<b>GENERAL</b>
<b>F.1.1</b>	<b>Actions</b>
	The Employer for this Contract is:  Name : Harry Gwala District Municipality Contact Name : Mr N. 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
<b>F.1.2</b>	<b>Tender Documents</b>
	(a) <b>The Tender Document</b> , issued by the Employer consists of the following:  <b><u>THE TENDER</u></b>  <b>T1: Tendering Procedures</b> T1.1: Tender Notice and Invitation to Tender T1.2: Tender Data  <b>T2: Returnable Documents</b> T2.1: List of Returnable Documents T2.2: Returnable Schedules and Documents  <b><u>THE CONTRACT</u></b>  <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  <b>Part 2: Pricing Data</b> C2.1: Pricing Instructions

CLAUSE No	
	<p>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                      C4.2: Geotechnical</p> <p><b>Part 5: Annexures</b>                      C5.1: Construction Health &amp; Safety Specification                      C5.2: Environmental Management Plan                      C5.3: Contract Signboard</p> <p><b>(b) The Drawings</b>, issued separately from this document</p> <p>The Tender Document and drawings shall be obtained from the Employer at the physical address stated in the Tender Notice, upon payment of the deposit stated in the Tender Notice.</p> <p>In addition, the following documents, which are obtainable separately, are also referred to and are deemed to form part of this tender.</p> <p><b>(c) “General Conditions of Contract for Construction Works – 3rd Edition 2015”</b></p> <p>This document is issued by the South African Institution of Civil Engineering. (Short title “General Conditions of Contract 2015”), and is obtainable separately. Tenderers shall obtain their own copies.</p> <p><b>(d) “Standardised Specifications for Civil Engineering Construction” SABS 1200</b></p> <p>This document is obtainable separately, and Tenderers shall obtain their own copies of the applicable sections.</p> <p><b>(e) The Occupational Health and Safety Act N° 85 of 1993 and Amendment Act N° 181 of 1993, and the Construction Regulations 2014 (Government Gazette N° 37305 of 07 February 2014, Notice N° R84)</b></p> <p>This document is obtainable separately, and Tenderers shall obtain their own copies.</p> <p><b>(f)</b> In addition Tenderers are advised, in their own interest, to obtain their own copies of the following acts, regulations and standards referred to in this document as they are essential for the Tenderer to get acquainted with the basics of construction management, the implementation of preferential construction procurement policies and participation of targeted enterprise and labour.</p> <p>(i) The Construction Industry Development Board Act No 38 of 2000 and the Regulations in terms of the CIDB Act 38/2000, as at the closing time of this Tender,</p> <p>(ii) SANS 1921:2004 Construction and Management</p>

CLAUSE No	
	<p>Part 1: General Engineering and Construction Works;                      Part 2: Accommodation of Traffic on Public Roads occupied by the Contractor.                      Part 6: HIV &amp; AIDS Awareness.</p> <p>(iii) SANS 10396:2003 Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures</p> <p>(iv) SANS 1914:2003 Targeted Construction Procurement, Parts 1 to 6, dealing with Participation of Targeted Enterprises, Joint Ventures, Targeted Labour, etc.</p> <p><b>(g)</b> The <b>Harry Gwala District Municipality</b> Supply Chain Management Policy in terms of Section III of the Local Government Municipal Finance Management Act (Act N° 56 of 2003).</p>
<b>F.1.4</b>	<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>Name: Zimile Consulting Engineers                      Address: 76 Hope Street                      Kokstad                      4700</p> <p>Tel N°: +27 39 940 9729                      Fax N°: N/A</p> <p>Contact Person: Innocent Masunungure                      Email: <a href="mailto:innocent@zimile.co.za">innocent@zimile.co.za</a></p>
<b>F.1.5</b>	<b>The Employer's right to accept or reject any tender offer</b> The Employer is not obliged to accept the lowest or any tender offered.
<b>F.2</b>	<b>TENDERER'S OBLIGATIONS</b>
<b>F.2.1</b>	<b>Eligibility</b> A Tenderer will only be eligible to submit a tender if he/she meets all of the following criteria: 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 See Returnable Documents T2.2.1 FORM A. Joint ventures are eligible to submit tenders provided that: <ul style="list-style-type: none"> <li>• every member of the joint venture is registered with the CIDB</li> <li>• the lead partner has a contractor grading designation in the class of construction work as specified in the Invitation to Tender.</li> <li>• 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> </ul> 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.

CLAUSE No	
<b>F.2.7</b>	<b>Site visit and clarification meeting</b>
	<p>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>
<b>F.2.8</b>	<b>Seek clarification</b>
	Working days shall be defined as Monday to Friday Inclusive and shall exclude all gazetted public holidays.
<b>F.2.11</b>	<b>Alterations to documents</b>
	<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>
<b>F.2.12</b>	<b>Alternative tender offers</b>
	No Alternative Offers will be accepted
<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	<b>Delivery of Tender</b>
	<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>

CLAUSE No	
	<p><b>Physical address : 40 Main Street, Ixopo</b></p> <p><b>Identification details : Construction of Kempsdale Dam Wall HGDM 823/HGDM/2022</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.
<b>F.2.15.1</b>	<b>Closing Time</b>
	The closing time for submission of Tender Offers is as stated in the Tender Notice and Invitation to Tender.
<b>F.2.16.1</b>	<b>Tender Offer Validity</b>
	The Tender Offer validity period is <b>90 days</b> from the closing time for submission of tenders.
<b>F.2.18</b>	<b>Provide Other Material</b>
	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.
<b>F.2.19</b>	<b>Inspections, tests, and analyses</b>
	Access shall be provided for inspections and testing by personnel acting on behalf of the Employer, subject to prior arrangement.
<b>F.2.20</b>	<b>Sureties, Bonds and Policies</b>
	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.
<b>F.2.22</b>	<b>Return of Tender Documents</b>
	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.
<b>F.3</b>	<b>THE EMPLOYER'S UNDERTAKINGS</b>
<b>F.3.1</b>	<b>Respond to requests from the tenderer</b>
	Working days shall be defined as Monday to Friday Inclusive and shall exclude all gazetted public holidays.



CLAUSE No	
<b>F.3.4</b>	<b>Opening of Tender Submissions</b>
	Tenders will be opened immediately after closing time of tenders (see Tender Notice and Invitation to Tender) at the location of the tender box.
<b>F.3.5</b>	<b>Two-envelope system</b>
	The two-envelope system will NOT be followed for this contract.
<b>F.3.8</b>	<b>Test for Responsiveness</b>
	The minimum qualifying Functionality Evaluation Score shall be <b>65 (Sixty-five)</b> points
<b>F.3.11</b>	<b>Evaluation of Tender Offers</b>
	The procedure for the evaluation of responsive Tenders is <b>Specific goal 1,2,3</b> (Financial Offer and Preference)
<b>F.3.11.3</b>	<b>Specific goal 1,2,3: Functionality, Price, and Preference</b>
	<p>1.1. The following preference point systems are applicable to all bids:</p> <ul style="list-style-type: none"> <li>- 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</li> <li>- The 90/10 preference point system is applicable to bids with a Rand value above R50 million (all applicable taxes included).</li> </ul> <p>1.2. The value of this bid is estimated to be above 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>F.3.11.8</b>	<b>Scoring preferences</b>
	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> .
<b>F.3.11.9</b>	<b>Scoring Functionality</b>
	<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>

CLAUSE No																			
	<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> <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 10px auto;"> <math display="block">P_s = 90 \left( 1 - \frac{P_t - P_{min}}{P_{min}} \right)</math> </div> <p>Where-</p> <p>P<sub>s</sub> = Points scored for price of tender under consideration.                      P<sub>t</sub> = Price of tender under consideration; and                      P<sub>min</sub> = Price of lowest acceptable tender.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">Description</th> <th style="text-align: right;">Maximum Allocated Points</th> </tr> </thead> <tbody> <tr> <td>Experience of Key Personnel (Contracts Manager)</td> <td style="text-align: right;">7</td> </tr> <tr> <td>Experience of Key Personnel (Site Agent)</td> <td style="text-align: right;">7</td> </tr> <tr> <td>Experience of Key Personnel (Structural/Civil Foreman)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Experience of Key Personnel (Pipe laying Foreman)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Experience of Bidder with respect to water projects</td> <td style="text-align: right;">55</td> </tr> <tr> <td>Financial Capacity</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Quality Assurance</td> <td style="text-align: right;">5</td> </tr> <tr> <td><b>TOTAL MAXIMUM POINTS</b></td> <td style="text-align: right;"><b>100</b></td> </tr> </tbody> </table>	Description	Maximum Allocated Points	Experience of Key Personnel (Contracts Manager)	7	Experience of Key Personnel (Site Agent)	7	Experience of Key Personnel (Structural/Civil Foreman)	3	Experience of Key Personnel (Pipe laying Foreman)	3	Experience of Bidder with respect to water projects	55	Financial Capacity	20	Quality Assurance	5	<b>TOTAL MAXIMUM POINTS</b>	<b>100</b>
Description	Maximum Allocated Points																		
Experience of Key Personnel (Contracts Manager)	7																		
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HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL

HGDM 823/HGDM/2022

CLAUSE No					
Returnable Schedule	Criteria	Points		Total Weighing %	Verification
Form D1	Tenderer's Experience in Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	No of completed Projects	Points	10	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.
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
Form D2	Tenderer's Experience in The Construction of River Diversion Works on Rivers Wider Than 10m	No of completed Projects	Points	10	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.
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
Form D3	Tenderer's experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)	No of completed Projects	Points	20	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.
		No Projects	0		
		1 Project	4		
		2 Projects	8		
		3 Projects	12		
		4 Projects	16		
Form D4	Tenderer's Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in width with associated infrastructure	No of completed Projects	Points	5	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D4 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.
		No Projects	0		
		1 Project	1		
		2 Projects	2		
		3 Projects	3		
		4 Projects	4		
Form D5	Tenderer's Experience in Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated	No of completed Projects	Points	10	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D5 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>
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		

CLAUSE No							
		civil and structural works	5 Projects and More	10	NB: All above information is required for each project claimed.		
	Form H	Tenderers Financial Standing	Undoubted for the tender amount 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 = 18			
			Average to good for the amount of tender inquiry, if strictly in the way of business	C = 16			
			Rating below good (D)	D-F = 14			
			Rating below F and non-complying	= 0			
	Form S	Experience of Key Personnel	Key Personnel	Experience	20		
			Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with 0-4 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering	0		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.  <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>	
			Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with 5- 10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering	3			
			Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with more than 10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering	7			
			Construction Manager / Site Agent with a Professional Registration with ECSA or SACPCMP with 0-4, years' experience on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)	0			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.  <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>
			Construction Manager / Site Agent with a Professional Registration with ECSA or SACPCMP with 5- 10 years' experience with at least 3 years of which on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)	3			
	Construction Manager / Site Agent with a Professional	7					

CLAUSE No					
			Registration with ECSA or SACPCMP with more than 10 years' experience with at least 5 years of which on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)		<p>Curricula Vitae to be attached to <b>FORM S</b>: Key Personnel which shows projects implemented by this Personnel and the Clients worked with.</p> <p>An originally certified copy (not copy of certified copy) of SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.</p> <p><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></p>
			Structural & Civil Foreman: With 0-4 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	0	
			Structural & Civil Foreman: With 5- 10 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	2	
			Structural & Civil Foreman: With more than 10 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	3	
			Pipe Laying Foreman: With 0-4 years' experience working on water pipelines	0	
			Pipe Laying Foreman: With 5- 8 years' experience working on water pipelines	2	
			Pipe Laying Foreman: With more than 8 years' experience working on water pipelines	3	
<b>Form X</b>	Quality Assurance Plan and Control Procedures	Score Status	Points	<b>5</b>	<p>If selected, attach current copy of ISO Accreditation Certificates to <b>Form I</b>.</p> <p>If selected, attach copy of Internal Quality Assurance Plan to <b>Form I</b>.</p>
		Have ISO 9001 Accreditation	5		
		Have Own Internal QA Plan	3		
		None	0		
<b>Form Z</b>	<b>Total Points Possible</b>			<b>100</b>	
<p><b><u>Tenderers that score less than 65% of the total score allowed for quality will not be considered further.</u></b></p>					

CLAUSE No																			
	<p>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.</p> <p><u>b) Financial Offer</u></p> <p>The financial offer will be scored using the following formula 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> <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 10px auto;"> <math display="block">P_s = 90 \left( 1 - \frac{P_t - P_{\min}}{P_{\min}} \right)</math> </div> <p>Where-                      Ps = Points scored for price of tender under consideration;                      Pt = Price of tender under consideration; and                      Pmin = Price of lowest acceptable tender.</p> <p><u>(c) Preferences</u></p> <p>Up to <b>20</b> points (for financial values up to R50 000 000) or <b>10</b> points (for financial values over R50 000 000) will be awarded to tenderers who are found to be eligible for the preference claimed.</p> <p>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.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">90/10</th> <th style="text-align: center;">Verification Method</th> </tr> </thead> <tbody> <tr> <td>Black Ownership ≥ 51%</td> <td style="text-align: center;">5</td> <td>ID Copies of directors, Company registration, CSD Report and shareholder certificates</td> </tr> <tr> <td>Less than 51 % owned by black people</td> <td style="text-align: center;">3</td> <td>ID Copies of directors, Company registration, CSD Report and shareholder certificates</td> </tr> <tr> <td>Locality (Enterprise that is located within the KZN Province, location to be determined by the address registered on the CSD).</td> <td style="text-align: center;">5</td> <td>CSD Report</td> </tr> <tr> <td>Locality (Enterprise that is not located within the KZN Province, location to be determined by the address registered on the CSD).</td> <td style="text-align: center;">3</td> <td>CSD Report</td> </tr> <tr> <td><b>TOTAL</b></td> <td style="text-align: center;"><b>10</b></td> <td></td> </tr> </tbody> </table>		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>	
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<b>F.3.13</b>	<b>Acceptance of Tender Offer</b>																		

CLAUSE No	
F.3.13.1	<p>Tender offers will only be accepted if:</p> <ul style="list-style-type: none"> <li>a) 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</li> <li>b) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation, by tender closing date;</li> <li>c) the tenderer is not in arrears for more than 3 months with the municipal rates and taxes and municipal services charges;</li> <li>d) 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 from doing business with the public sector;</li> <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>
<b>F.3.17</b>	<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> . Bid documents downloaded from the Harry Gwala District Municipality website must be printed in colour. (Each section to be printed in the required coloured pages as indicated in the table of contents).
<b>F.3.20</b>	<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.

**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 specific goals 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.
2. If the Municipality applies ownership as specific goal, the Municipality must advertise the tender with a specific tendering preferential procurement requirement that in order for a tenderer to claim 10 / 20 points for specific goals, bidder must have the following ownership structure:
  - 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**

. 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
2. 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:

$$NQ = W_2 \times SO / MS$$

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

$W_2$  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.

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**T2      RETURNABLE DOCUMENTS AND SCHEDULES**

**CONSTRUCTION OF THE KEMPSDALE DAM WALL**

**CONTRACT NO. HGDM 823/HGDM/2022**

**PART T2: RETURNABLE DOCUMENTS AND SCHEDULES**

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## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

### **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)

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

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- Adjudicator's Agreement (Part C1)
- Agreement in Terms of the OHSA No 85 of 1993 (Part C1)
- Bill of Quantities (Part C2)
- Scope of Work (Part C3)
- Site information (Part C4)
- Drawings (Part C5)

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
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**FORM A..... Certificate of attendance at clarification meeting**

**CONTRACT N° HGDM 823/HGDM/2022**

**CONSTRUCTION OF THE KEMPSDALE DAM WALL**

(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 .....



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
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**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 823/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 823/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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
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**C. Certificate for 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<sup>o</sup> **HGDM 823/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.

<b>Name of Firm</b>	<b>Address</b>	<b>Authorising Name and Capacity</b>	<b>Authorising Signature</b>
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<sup>o</sup> **HGDM 823/HGDM/2022** and any contract resulting from it on our behalf.

<b>Name</b>	<b>Address</b>	<b>Signature</b>	<b>Date</b>

*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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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.

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

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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
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**FORM D..... SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**FORM D1 : SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

The Tenderer shall list below all dam construction projects. This information is material to the award of the Contract. List here Tenderer's Experience in Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure.

**Maximum Score = 10**

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°		
Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	<b>No Projects</b>						0 Projects	0
	<b>Name of Project 1</b>	:					1 Projects	2
	<b>Dam Height in Meters</b>	:						
<b>Volume of Concrete in m3</b>	:				<b>m<sup>3</sup></b>			
Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	<b>Name of Project 2</b>	:					2 Projects	4
	<b>Dam Height in Meters</b>	:						
	<b>Volume of Concrete in m3</b>	:				<b>m<sup>3</sup></b>		
Signature (of person authorised to sign on behalf of the tenderer) : .....							Date:.....	

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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°			
Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	<b>Name of Project 3</b> : <b>Dam Height in Meters</b> : <b>Volume of Concrete in m3</b> : <span style="float:right">m<sup>3</sup></span>					3 Projects	6	
	<b>Name of Project 4</b> : <b>Dam Height in Meters</b> : <b>Volume of Concrete in m3</b> : <span style="float:right">m<sup>3</sup></span>					4 Projects	8	
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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°			
Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	Name of Project 5 : Dam Height in Meters : Volume of Concrete in m3 : <span style="float: right;">m<sup>3</sup></span>					5 Projects and More	10	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	<b>10</b>	
						Actual Points Obtained <b>D1</b> =		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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

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

**Dam height in meters** : .....

**Volume of concrete in m3** : .....



.....  
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.**



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**FORM D2: SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

The Tenderer shall list below all river diversion works. This information is material to the award of the Contract. List here Tenderer's Experience in The Construction of River Diversion Works on Rivers Wider Than 10m

**Maximum Score = 10**

D2	List below contracts of similar work 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°			
	<b>No Projects</b>					0 Projects	0	
Construction Of River Diversion Works on Rivers Wider Than 10m	Name of Project 1 : Width of River : Type of Diversion (Concrete, Earth, Gabion, etc) :					1 Project	2	
	Name of Project 2 : Width of River : Type of Diversion (Concrete, Earth, Gabion, etc) :					2 Projects	4	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D2	List below contracts of similar work 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°			
Construction Of River Diversion Works on Rivers Wider Than 10m	Name of Project 3 : Width of River : Type of Diversion (Concrete, Earth, Gabion, etc) :					3 Projects	6	
	Name of Project 4 : Width of River : Type of Diversion (Concrete, Earth, Gabion, etc) :					4 Projects	8	
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D2	List below contracts of similar work 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°			
Construction Of River Diversion Works on Rivers Wider Than 10m	Name of Project 5 : Width of River : Type of Diversion (Concrete, Earth, Gabion, etc) :					5 Projects and More	10	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	<b>10</b>	
						Actual Points Obtained <b>D2</b> =		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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

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

**Width of river** : .....

**Type of diversion** : .....



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

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

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**FORM D3: SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

The Tenderer shall list below all Grade 8 related projects completed in the past 5 years. This information is material to the award of the Contract. List here Tenderer's Experience in projects of Category Grade 8. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)

**Maximum Score = 20**

D3	List below contracts of similar work 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°			
No Projects						0 Projects	0	
Experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)	Name of Project 1: Rand Value :					1 Project	4	
	Name of Project 2: Rand Value :					2 Projects	8	
Signature (of person authorised to sign on behalf of the tenderer) : .....						Date:.....		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
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D3	List below contracts of similar work 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						
Experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above),		Project Value	Contact Name	Client Organisation	Tel N°			
	Name of Project 3: Rand Value :					3 Projects	12	
Name of Project 4: Rand Value :					4 Projects	16		
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D3	List below contracts of similar work 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						
Experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)		Project Value	Contact Name	Client Organisation	Tel N°			
	Name of Project 5: Rand Value :						5 Projects and More	20
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			
Possible Ful Points =						<b>20</b>		
Actual Points Obtained <b>D3</b> =								

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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

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

**Rand Value** : .....



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

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



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**FORM D4: SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

The Tenderer shall list below all construction of gravel road and associated works. This information is material to the award of the Contract. List here Tenderer's Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in width with associated infrastructure.

**Maximum Score = 5**

D4	List below contracts of similar work undertaken for each discipline/category as main contractor. <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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°			
	<b>No Projects</b>					0 Projects	0	
Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in width with associated infrastructure	Name of Project 1 : Type of Road : Length of Road :					1 Projects	1	
	Name of Project 2 : Type of Road : Length of Road :					2 Projects	2	
Signature (of person authorised to sign on behalf of the tenderer) : .....						Date:.....		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D4	List below contracts of similar work undertaken for each discipline/category as main contractor. A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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.					No of Projects Completed	Points	Score (S)
Category	Contract	Client Reference						
Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in width with associated infrastructure		Project Value	Contact Name	Client Organisation	Tel N°			
	Name of Project 3 : Type of Road : Length of Road :					3 Projects	3	
Name of Project 4 : Type of Road : Length of Road :					4 Projects	4		
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D4	List below contracts of similar work undertaken for each discipline/category as main contractor. <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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						
Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in width with associated infrastructure		Project Value	Contact Name	Client Organisation	Tel N°	5 Projects and More	5	
	Name of Project 5 : Type of Road : Length of Road :							
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	5	
						Actual Points Obtained D4 =		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
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**Clients Name** : .....

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

**Type of Road** : .....

**Length of Road** : ..... m



.....  
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.**

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

**FORM D5: SCHEDULE OF WORK CARRIED OUT BY THE TENDERER**

The Tenderer shall list below all pumpstation related works. This information is material to the award of the Contract. List here Tenderer’s Experience in in the installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works.

**Maximum Score = 10**

D5	List below contracts of similar work undertaken for each discipline/category as main contractor. <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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°			
	<b>No Projects</b>					0 Projects	0	
Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works	Name of Project 1 : Pumping Nominal Flow Rate : .....l/sec Pumping head : .....m					1 Projects	2	
	Name of Project 2 : Pumping Nominal Flow Rate : .....l/sec Pumping head : .....m					2 Projects	4	
Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....			

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

D5	List below contracts of similar work undertaken for each discipline/category as main contractor. <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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°			
Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works	Name of Project 3 : Pumping Nominal Flow Rate : .....l/sec Pumping head : .....m					3 Projects	6	
	Name of Project 4 : Pumping Nominal Flow Rate : .....l/sec Pumping head : .....m					4 Projects	8	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

<b>D5</b>	List below contracts of similar work undertaken for each discipline/category as main contractor. <b>A SIGNED APPOINTMENT LETTER AND CERTIFIED CERTIFICATE OF COMPLETION, SIGNED AND STAMPED FORM D4 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>					<b>No of Projects Completed</b>	<b>Points</b>	<b>Score (S)</b>
<b>Category</b>	<b>Contract</b>	<b>Client Reference</b>						
		<b>Project Value</b>	<b>Contact Name</b>	<b>Client Organisation</b>	<b>Tel N°</b>			
Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works	Name of Project 5 : Pumping Nominal Flow Rate : .....l/sec Pumping head : .....m					5 Projects and More	10	
	Signature (of person authorised to sign on behalf of the tenderer) : .....					Date:.....		
						Possible Ful Points =	<b>10</b>	
						Actual Points Obtained <b>D5</b> =		

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
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**Clients Name** : .....

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

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

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

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



.....  
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.**



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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**

<b>PAGE, CLAUSE OR ITEM NO</b>	<b>PROPOSED AMENDMENT</b>

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**

<b>PROPOSED ALTERNATIVE</b>	<b>DESCRIPTION OF ALTERNATIVE</b>

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
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**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)

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
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**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.

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**FORM H..... Tenderers Financial Standing**

**CONTRACT No. HGDM 823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

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, an original bank-stamped rating letter, certified by the banker, to the effect that Tenderer 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 an original bank-stamped rating letter with his/her 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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**BANK STAMPED 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.***

***Maximum Score = 20***

<b>H</b>	<b>Score one of the ratings listed below as reflected on rating received</b>	<b>Points</b>	<b>Score (S)</b>
	Bank Rating A – Undoubted for the amount of enquiry	20	
	Bank Rating B – Good for the amount of enquiry	18	
	Bank Rating C – Average to Good for the amount quoted if applied strictly in the way of business	16	
	Bank Rating D to F – Rating below good (D)	14	
	Bank Rating below F and non-complying	0	
		<b>Possible Full Points = 20</b>	
		<b>Actual Points Obtained H =</b>	

*\*for office use only\**

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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### **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*

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
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**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



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**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;

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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 \_\_\_\_\_

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**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

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### FORM L1: MBD2 FORM (TAX CLEARANCE CERTIFICATE REQUIREMENTS)

#### 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)

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**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**

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- 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:  
.....  
.....

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

<b>Full Name</b>	<b>Identity Number</b>	<b>State Employee Number</b>

.....  
**Signature**

.....  
**Date**

.....  
**Capacity**  
.....

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

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**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

.....  
.....



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**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

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

**Preferential Procurement (MBD 6.1)**

**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
<b>PRICE</b>	
<b>SPECIFIC GOALS</b>	
<b>Total points for Price and SPECIFIC GOALS</b>	<b>100</b>

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.

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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:

$$\begin{array}{ccc} \mathbf{80/20} & \mathbf{or} & \mathbf{90/10} \\ \\ \mathbf{Ps} = \mathbf{80} \left( \mathbf{1} - \frac{\mathbf{Pt} - \mathbf{Pmin}}{\mathbf{Pmin}} \right) & \mathbf{or} & \mathbf{Ps} = \mathbf{90} \left( \mathbf{1} - \frac{\mathbf{Pt} - \mathbf{Pmin}}{\mathbf{Pmin}} \right) \end{array}$$

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:

$$\begin{array}{ccc} \mathbf{80/20} & \mathbf{or} & \mathbf{90/10} \end{array}$$

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

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
Experience of Key Personnel (Contracts Manager)	7
Experience of Key Personnel (Site Agent)	7
Experience of Key Personnel (Structural/Civil Foreman)	3
Experience of Key Personnel (Pipe laying Foreman)	3
Experience of Bidder with respect to water projects	55
Financial Capacity	20
Quality Assurance	5
<b>TOTAL MAXIMUM POINTS</b>	<b>100</b>

Returnable Schedule	Criteria	Points	Total Weighting %	Verification	
Form D1	Tenderer's Experience in Dam Construction of more than 2m high using conventional vibrated concrete (CVC), stepped spillway, earthworks, and associated infrastructure	No of Projects completed	Points	10	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.
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
5 Projects and more	10				
Form D2	Tenderer's Experience in The Construction of River Diversion Works on Rivers Wider Than 10m	No of Projects completed	Points	10	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.
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		
		4 Projects	8		
5 Projects and more	10				
Form D3	Tenderer's experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)	No of Projects completed	Points	20	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.
		No Projects	0		
		1 Project	5		
		2 Projects	10		
		3 Projects	15		
		4 Projects	20		
5 Projects and More	25				
Form D4	Tenderer's Experience in The Construction of Gravel Roads of more than 500m in length and more than 6m in	No of Projects completed	Points	5	Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor). <b>Note: Form D4 must be used as a template to generate the reference</b>
		No Projects	0		
		1 Project	2		
		2 Projects	4		
		3 Projects	6		

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	width with associated infrastructure	4 Projects 5 Projects and More	8 10		<p><b>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></p> <p>NB: All above information is required for each project claimed.</p>
<b>Form D5</b>	Tenderer's Experience in Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works	No of Projects completed No Projects 1 Project 2 Projects 3 Projects 4 Projects 5 Projects and More	Points 0 2 4 6 8 10	<b>10</b>	<p>Appointment letters, Completion Certificates and Reference letters (for subcontracting also attach appointment letter of main contractor).</p> <p><b>Note: Form D5 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></p> <p>NB: All above information is required for each project claimed.</p>
<b>Form H</b>	Tenderers Financial Standing	Undoubted for the tender amount enquiry Good for tender amount quoted Average to good for the amount of tender inquiry, if strictly in the way of business Rating below good (D) Rating below F and non-complying	A = 20 B = 18 C = 16 D-F = 14 = 0	<b>20</b>	<p>Rating by bank where account is held (Originally Stamped by Bank not older than 3 months), attached to <b>Form H</b>.</p>
<b>Form S</b>	Experience of Key Personnel	Key Personnel Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with 0-4 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with 5 -10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering Contracts Manager: Relevant Professional Registration with ECSA or SACPCMP, with more than 10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering Construction Manager / Site Agent with a Professional Registration with ECSA or SACPCMP with 0-4, years' experience on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering) Construction Manager / Site Agent with a Professional Registration with	Experience 0 3 7 0 3	<b>30</b>	<p>Curricula Vitae to be attached to FORM S Key Personnel.</p> <p>An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.</p> <p>An originally certified (not copy of certified copy) copy of the relevant Degree or Diploma in Civil Engineering.</p> <p><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></p> <p>Curricula Vitae to be attached to FORM S Key Personnel.</p> <p>An originally certified copy (not copy of certified copy) of ECSA or SACPCPM.</p> <p>An originally certified (not copy of certified copy) copy of the relevant Degree or Diploma in Civil Engineering.</p>

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		ECSA or SACPCMP with 5- 10 years' experience with at least 3 years of which on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)			<p><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></p>	
		Construction Manager / Site Agent with a Professional Registration with ECSA or SACPCMP with more than 10 years' experience with at least 5 years of which on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)	7			
		Structural & Civil Foreman: With 0-4 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	0			<p>Curricula Vitae to be attached to FORM S: Key Personnel which shows projects implemented by this Personnel and the Clients worked with.</p> <p>An originally certified copy (not copy of certified copy) of SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.</p> <p><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></p>
		Structural & Civil Foreman: With 5- 10 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	2			
		Structural & Civil Foreman: With more than 10 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	3			
		Pipe Laying Foreman: With 0-4 years' experience working on water pipelines	0			
		Pipe Laying Foreman: With 5- 8 years' experience working on water pipelines	2			<p>Curricula Vitae to be attached to FORM S: Key Personnel which shows projects implemented by this Personnel and the Clients worked with.</p> <p><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></p>
		Pipe Laying Foreman: With more than 8 years' experience working on water pipelines	3			
<b>Form X</b>	Quality Assurance Plan and Control Procedures	Score Status	Points	<b>5</b>		<p>If selected, attach current copy of ISO Accreditation Certificates to <b>Form I</b>.</p>
		Have ISO 9001	5			

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		Accreditation			
		Have Own Internal QA Plan	3		If selected, attach copy of Internal Quality Assurance Plan to <b>Form I</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.**

**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)

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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;



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- 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>	.....
	.....
	.....
	.....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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:	.....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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 .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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:	.....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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 APPLICABLE (ALL TAXES INCLUDED)	COMPLETION DATE	B-BBEE STATUS LEVEL 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:  
.....

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

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### 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>audialterampartem</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:		

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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**

.....  
**Date**

.....  
**Position**

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

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

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### **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.**



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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;

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

- (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

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**FORM O ..... Joint Venture Disclosure Form**

<b>EMPLOYER</b>	:	<b>Harry Gwala District Municipality</b>
<b>CONTRACT DESCRIPTION</b>	:	<b>CONSTRUCTION OF KEMPSDALE DAM WALL</b>
<b>CONTRACT NUMBER</b>	:	<b>HGDM823/HGDM/2022</b>
<b>PROJECT REFERENCE NUMBER</b>	:	

- 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 : \_\_\_\_\_

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**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. : .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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- 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				

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

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**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 : .....

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**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 : .....

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

---

CONTRACT No. HGDM 823/HGDM/2022

### CONSTRUCTION OF THE RAISING OF KEMPSDALE DAM WALL

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

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**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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 (type, size, capacity etc)	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 (type, size, capacity etc)	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: .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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:** .....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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:

	<b>Date</b>	<b>Title or Details</b>
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)*

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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 (Structural & Civil)**

<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>

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**d. Foreman (Pipe Laying)**

<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: .....

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

Tenderers to attach CV of the following proposed site staff:

1. Site Agent
2. Foreman (Structural & Civil and Pipe laying)
3. Contracts Manager

**Maximum Score = 30**

S	Proposed key Personnel	Experience	Points	Score (S)
	Contracts Manager  Name:	Relevant Professional Registration with ECSA or SACPCMP, with more than 10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering	7	
	Construction Manager/Site Agent <b>Note:</b> The Construction Manager must not be the same person as the Contracts Manager Name:	Construction Manager / Site Agent with a Professional Registration with ECSA or SACPCMP with more than 10 years' experience with at least 5 years of which on dam or water retaining structures or bridges across a stream and a qualification (degree or diploma) in the Built Environment (Civil Engineering)	7	
	Structural & Civil Works Foreman  Name:	With more than 10 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.	3	
	Pipe laying Foreman  Name:	With more than 8 years' experience working on water pipelines	3	
	<b>Possible Full Points =</b>		<b>20</b>	
	<b>Actual Points Obtained S =</b>			

*\*for office use only\**

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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.

<b>SPECIAL MATERIAL</b>	<b>UNIT*</b>	<b>Rate or Price for the Base Month</b>

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)*

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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)



**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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:.....

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**FORM V ..... UIF Registration Certificate**

*Tenderers to attach copy of UIF Registration Certificate*

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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>HGDM823/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

## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**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*

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**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)

**Maximum Score = 5**

X	Score one status as listed below	Points	Score (S)
	ISO 9001 Accreditation	5	
	Own Internal QA Plan	3	
	None	0	
	<b>Possible Full Points =</b>	<b>5</b>	
	<b>Actual Points Obtained X</b>	<b>=</b>	

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## T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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### 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.

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY

CONSTRUCTION OF KEMPSDALE DAM WALL  
HGDM 823/HGDM/2022

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**57. APPROVAL AND IMPLEMENTATION OF POLICY**

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

**T2.2.1 – RETURNABLE SCHEDULES AND DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES**

HARRY GWALA DISTRICT MUNICIPALITY  
 CONSTRUCTION OF KEMPSDALE DAM WALL  
 HGDM 823/HGDM/2022

**FORM Z..... TOTAL SCORE (FUNCTIONALITY)**

	<b>Criteria</b>	<b>Possible Full Points</b>	<b>Actual Points Obtained</b>
<b>1</b>	Experience applicable to concrete dams and water retaining structures	10	D1=
<b>2</b>	Experience applicable to River Diversions	10	D2=
<b>3</b>	Experience in projects of Category Grade 8 completed in the past 5 years. (Other non-dam related structures and projects with rand value of R100,000,000.00 each and above)	20	D3=
<b>4</b>	Experience applicable to gravel road Construction	5	D4 =
<b>5</b>	Experience in Installation of Mechanical and Electrical Components of a Water Pump Station capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works	10	D5 =
<b>6</b>	Financial Resources	20	H =
<b>7</b>	Experience of Key Personnel	20	S =
<b>8</b>	Quality Assurance Plan and Control Procedures	5	X =
	<b>Total Possible Points</b>	<b>100</b>	<b>Total Points Obtained =</b>

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**Note:** Only Eligible for Evaluation if Total points scored are ≥ 65 points



**CONTRACT HGDM 823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**PART C1: AGREEMENTS AND CONTRACT DATA**

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**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 823/HGDM/2022**

**CONSTRUCTION OF THE KEMPSDALE DAM WALL**

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°:.....

**HARRY GWALA DISTRICT MUNICIPALITY**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**HGDM 823/HGDM/2022**

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**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****RAISING OF KEMPSDALE DAM WITH CVC AND CONSTRUCTION OF ASSOCIATED APERTURES**

	<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@harrygwalam.gov.za">BiyaseNk@harrygwalam.gov.za</a> Tel N°: +27 39 834 8700 Fax N°: +27 39 834 2259
Name of Employer's Agent	1.1.1.16	Zimile Consulting Engineers represented by Innocent Masunungure, Pr. Eng.
Address of the Employer's Agent	1.2.1.2	76 Hope Street Kokstad 4700 Email: <a href="mailto:info@zimile.co.za">info@zimile.co.za</a> <a href="mailto:innocent@zimile.co.za">innocent@zimile.co.za</a> Tel: +27 39 940 6729 Fax: N/A
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 commencement date



	GCC 2015 Clause	
Competent Employees	4.11.1	<p>The Contractor shall employ on the Site, for the execution and completion of the Works, the following key employees with the requisite qualifications &amp; experience: "Persons specified on 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 10 years' experience in the Built Environment (Civil Engineering) and a degree or diploma in civil engineering/construction management</p> <p><b>Site Agent/Construction Manager:</b> registration with ECSA or SACPCMP with more than 15, years' experience with at least 5 years of which on dam or water retaining structures or bridges across a stream and Degree or Diploma in Civil Engineering</p> <p><b>Structural &amp; Civil Foreman:</b> Structural &amp; Civil Foreman: With more than 15 years' experience working on concrete structures with a minimum SAQA qualification NQF level 4 in the Built Environment (Civil Engineering) or equivalent.</p> <p><b>Pipe Laying Foreman:</b> Pipe Laying Foreman: With more than 8 years' experience working on water pipelines</p>
Non-working Days	5.8.1	Sundays
Special Non-working 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 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 or 0.05% x contract value per calendar day
The Latent Defect Period	5.16.3	10 years
Contract Price Adjustment Schedule	6.8.2	<p>x = 0,15 a = 0,20 b = 0,20 c = 0,50 d = 0,10</p> <p>'L' shall be the "Weighted Average" index, P0141, Table A</p> <p>'F' shall be the "Fuel (Diesel)" index given in P0142.1 Table 12 for KwaZulu Natal</p>
Area for Producer Price Index		Pietermaritzburg
Base Month		Month before closing date of Tenders

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	<b>GCC 2015 Clause</b>	
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
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	24 Months
Security to be Provided by Contractor	6.2.1	Refer to Table Below
<b>Type of Security</b>		<b>Contractor's Choice</b>

		(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 10% of the Contract Sum																				
Performance Guarantee of 10% of the Contract Sum																				
Retention of 10% of the value of Works																				
Cash Deposit of 10% of the Contract Sum plus Retention of 10% of the value of Works																				
Performance Guarantee of 10% of the Contract Sum plus Retention of 10% of the value of Works																				
Price variation of special materials*	6.8.3	.....																		
<table border="1"> <thead> <tr> <th>Type of Special Material</th> <th>Unit</th> <th>Rate or Price*</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>			Type of Special Material	Unit	Rate or Price*															
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: .....

“Employer’s Agent” 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**

Employer’s Agent 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 Employer’s Agent of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Employer’s Agent 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:

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- 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 Employer's Agent 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 the 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.

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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).....

Employer's Agent:  
(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 Employer's Agent.
5. I do not have any financial connections with the Contractor, Employer or Employer's Agent.
6. I do not have or not have had a personal relationship with any authoritative member of the Contractor, Employer or the Employer's Agent 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 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.



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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: .....

**HARRY GWALA DISTRICT MUNICIPALITY**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

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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 Employer’s Agent 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.

**HARRY GWALA DISTRICT MUNICIPALITY**

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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*

**CONTRACT No. HGDM 823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**PART C2: PRICING DATA**

**INDEX**

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## 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**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 1: GENERAL**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
1.1		SANS 1200 A	SECTION 1: GENERAL				
1.01		8.3	SCHEDULED FIXED-CHARGE AND VALUE RELATED ITEMS				
1.02		8.3.1	Contractual Requirements	Sum	1		
1.03		8.3.2	Establishment of Facilities on the Site:				
1.04		8.3.2.1	Facilities for Employer Agent (SANS 1200 AB)				
1.05		PSA 8.3.2.1	(a) Facilities for Agents Office (3 No)	Sum	1		
1.06		PSA 8.3.2.1	(b) Communication costs	Sum	3		
1.07		8.3.2.1	(c) Provision of name boards	Sum	2		
1.08		PSA 8.3.2.1	(d) Electronic equipment	Sum	1		
1.09		PSA 8.3.2.1	(e) Provision of survey equipment	Sum	1		
1.10		8.3.2.2	Facilities for Contractor				
1.11		8.3.2.2	(a) Offices and storage sheds	Sum	1		
1.12		8.3.2.2	(b) Workshops	Sum	1		
1.13		8.3.2.2	(c) Laboratories	Sum	1		
1.14		8.3.2.2	(d) Living Accomodation	Sum	1		
1.15		8.3.2.2	(e) Ablution and latrine facilities	Sum	1		
1.16		8.3.2.2	(f) Tools and Equipment	Sum	1		
1.17		8.3.2.2	(g) Water supplies, electric power and communications	Sum	1		
1.18		8.3.2.2	(h) Dealing with water (Sub clause 5.5)	Sum	1		
1.19		8.3.2.2	(i) Access (Sub clause 5.8)	Sum	1		
1.20		8.3.2.2	(j) Plant	Sum	1		
		8.3.3	Other Fixed Charge Obligations				
1.21		PSA 8.3.3.1	Issuing of notices to consumers	Sum	1		
1.22		PSA 8.3.3.2	OHS Act Obligations:				
1.23		PSA 8.3.3.2	i) General Safety obligations (incl. provision of personal protective equipment)	Sum	1		
1.24		PSA 8.3.3.2	ii) Health and Safety plan/file including health and safety training.	Sum	1		
		8.3.4	Removal of Site Establishment	Sum	1		
		PSA 8.3.5	Occupational Health and Safety				
1.25		PSA 8.3.5.1	Contractor's initial obligations in respect of the Occupational Health and Safety Act and Contractual Requirements	Sum	1		
1.26		PSA 8.3.5.2	Occupational Health and Safety Act	Sum	1		
1.27		PSA 8.3.5.3	Contractor's time related obligation in respect of the OH & S Act and Construction Regulation	Sum	1		
1.28		PSA 8.3.5.4	Environmental Management Plan Obligations	Sum	1		
Total Carried Forward							

SECTION 1: GENERAL									
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY				
Brought Forward									
		<b>8.4</b>	<b>SCHEDULED TIME-RELATED ITEMS</b>						
1.29		8.4.1	Contractual Requirements.	Month	24				
1.30		8.4.2	Operate and maintain facilities on the Site for duration of Construction:						
		<b>8.4.2.1</b>	<b>Facilities for Engineer</b>						
1.31		PSA 8.4.2.1	(a) Engineer's office (3 furnished rooms)	Month	24				
1.32		PSA 8.4.2.1	(b) Communication costs (cellular phone)	Month	24				
1.33		8.4.2.1	(c) Nameboards (2 No.)	Month	24				
1.34		PSA 8.4.2.1	(d) Electronic equipment	Month	24				
1.35		PSA 8.4.2.1	(e) Provision of survey equipment	Month	24				
		<b>8.4.2.2</b>	<b>Facilities for Contractor:</b>						
1.36		8.4.2.2	(a) Offices and storage sheds	Month	24				
1.37		8.4.2.2	(b) Workshops	Month	24				
1.38		8.4.2.2	(c) Laboratories	Month	24				
1.39		8.4.2.2	(d) Living accomodation	Month	24				
1.40		8.4.2.2	(e) Ablution and latrine facilities	Month	24				
1.41		8.4.2.2	(f) Tools and equipment	Month	24				
1.42		8.4.2.2	(g) Water supplies, electric power and communications	Month	24				
1.43		8.4.2.2	(h) Dealing with water (Sub clause 5.5)	Month	24				
1.44		8.4.2.2	(i) Access (sub clause 5.5)	Month	24				
1.45		8.4.2.2	(j) Plant	Month	24				
1.46		8.4.3	Supervision for the Duration of Construction	Month	24				
1.47		8.4.4	Company and Head Office Overhead Costs for Duration of Contract	Month	24				
1.48		8.4.5	Other Time-related Obligations	Month	24				
		<b>PSA 8.4.6.1</b>	<b>OHS Act Obligations</b>						
1.49		PSA 8.4.6.1	i) General Safety obligations	Month	24				
1.50		PSA 8.4.6.1	ii) Health and Safety plan/file	Month	24				
1.51		PSA 8.4.6.1	(iii) Safety Officer	Month	24				
1.52		PSA 8.4.6.2	Security Services	Month	24				
1.53		PSA 8.4.6.3	Environmental Management Plan Obligations	Month	24				
		<b>8.5</b>	<b>SUMS STATED PROVISIONALLY BY ENGINEER</b>						
1.54		PSA 8.5	a) For work to be done by Contractor and values in terms of Clause 8.1.2.1 (d) of conditions contract						
1.55		PSA 8.5	i) Appoint a Community Liaison Officer from the community for the duration (24 months) of the contract	Sum	24	R8 000.00	R192 000.00		
1.56		PSA 8.5	ii) PSC Meetings Attendance	Sum	24	R10 000.00	R240 000.00		
Total Carried Forward									

SECTION 1: GENERAL							
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY		
Brought Forward							
1.57		PSA 8.5	iii) Overheads, Charge and Profit (i) above	%	5%	R192 000.00	R9 600.00
1.58		PSA 8.5	b) For work to be done by a nominated sub-contractor (or Employer)				
1.59		PSA 8.5	i) Control tests by independent laboratory. Additional tests that may be required by the Engineer over and above normal quality control tests performed by the Contractor.	Prov Sum	1	R200 000.00	R200 000.00
1.60		PSA 8.5	ii) Overheads, charges and profit on item (i) above	%	5.00%	R10 000.00	R10 000.00
1.61		PSA 8.5	iii) Relocation of existing services (water mains, electricity cables/poles, etc.) by Services utility	Prov Sum	1	R25 000.00	R25 000.00
1.62		PSA 8.5	iv) Overheads, charges and profit on item (iii) above	%	5.00%	R1 250.00	R1 250.00
1.63		PSA 8.5	v) Training services	Prov Sum	3	R45 000.00	R135 000.00
1.64		PSA 8.5	vi) Overheads, charges and profit on item (v) above	%	5.00%	R6 750.00	R6 750.00
1.65		PSA 8.5	c) Provision for the Relocation of existing services and facilities as per land agreement for the following items:				
1.66		PSA 8.5	i) 2No.Water mains, electricity cables/poles, etc. by Services utility	Prov Sum	1	R1 232 000.00	R1 232 000.00
1.67		PSA 8.5	ii) 2 No.Pumping system - Pumps including piping and fittings	Prov Sum	1	R980 000.00	R980 000.00
1.68		PSA 8.5	iii) 2 No.Bird Hide	Prov Sum	1	R28 000.00	R28 000.00
1.69		PSA 8.5	iv) 2 No.Boma and boat storage	Prov Sum	1	R560 000.00	R560 000.00
1.69.1			v) Overheads charges and profit on items c(i) - (iv)	%	5.00%	R140 000.00	R140 000.00
1.70		PSA 8.5	Provision for Health, Safety & Environmental Control	Prov Sum	1	R960 000.00	R960 000.00
1.71		PSA 8.5	(a) Provision for the design and construction of the flow measuring structure at the existing weir	Prov Sum	1	R2 881 004.00	R2 881 004.00
			(b) Overheads, charges and profit on item (a) above	%	5.00%	R144 050.20	R144 050.20
		<b>8.6</b>	<b>PRIME COST ITEMS</b>				
1.72		8.6	(a) Prime cost of goods or materials to be supplied to the site of the works in terms of the contract	Stated Sum	1	R30 000.00	R30 000.00
1.73		8.6	(b) Overheads, charges and profit on item (a) above	%	5.00%	R1 500.00	R1 500.00
1.74		8.6	(c) Transport and Labour to handle and install item (c) above as specified in PSA	Sum	5	R10 000.00	R50 000.00
1.74.1			(d) Overheads charges and profit on items © above	%	5.00%	R2 500.00	R2 500.00
		<b>8.7</b>	<b>DAYWORKS</b>				
		PSA 8.7.1	<b>Daywork (Labour)</b>				
1.75		PSA 8.7.1	(a) Unskilled labour	hours	100		
1.76		PSA 8.7.1	(b) Semi-skilled labour	hours	100		
1.77		PSA 8.7.1	(c) Construction-hand and operator	hours	100		
1.78		PSA 8.7.1	(d) Foreman	hours	100		
1.79		PSA 8.7.1	(e) Steel Fixer	hours	100		
1.80		PSA 8.7.1	(f) Welder	hours	100		
		<b>8.7.2</b>	<b>PLANT</b>				
			Tenderers to insert the hire rate at which each item will be charged that will cover all relevant costs of plant hire, including operating crew				
1.81		PSA 8.7.2	(a) Lowbed transport of plant to and from site	hours	50		
Total Carried Forward							

SECTION 1: GENERAL								
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY			
Brought Forward								
1.82		PSA 8.7.2	(b) Mobile Crane 5t at 3m radius	hours	50			
1.83		PSA 8.7.2	(c) Back acting excavators (Hitachi EX200 or similar)	hours	50			
1.84		PSA 8.7.2	(d) TLB	hours	50			
1.85		PSA 8.7.2	(e) Compressors (250CFM or equivalent)	hours	50			
1.86		PSA 8.7.2	(f) Tipper trucks (10t or equivalent)	hours	50			
1.87		PSA 8.7.2	(g) Water tanker	hours	50			
1.88		PSA 8.7.2	(h) Water Pump	hours	50			
1.89		PSA 8.7.2	(i) Plate compactor	hours	50			
1.90		PSA 8.7.2	(j) Light delivery vehicles (1t or equivalent)	hours	50			
1.91		PSA 8.7.2	(k) Generator	hours	50			
		<b>8.8</b>	<b>TEMPORARY WORKS</b>					
1.92		8.8.1	Main Access Road to Works: construct	Sum	1			
1.93		8.8.2	Dealing with Traffic (or accommodation of traffic)	Sum	1			
1.94		8.8.3	Protection of pump house structure until Construction in Vicinity is Complete	Sum	1			
		<b>8.8.4</b>	<b>Existing Services</b>					
1.95		8.8.4	(a) Supply (or hire) of specialist equipment for the detection of underground services (Prov)	Sum	5			
1.96		8.8.4	(b) The use of equipment for detection referred to in item above	Sum	5			
1.97		8.8.4	(c) Excavation by hand in soft material to expose service	m <sup>3</sup>	30			
1.98		8.8.4	(d) Temporary protection, as required in terms of the project specification, of existing service	Sum	5			
		<b>8.8.5</b>	<b>Cost of the Survey in Terms of Land Survey Act</b>					
1.99		8.8.5	(a) Tri-gonometrical survey beacons, bench marks and plot boundary pegs, -locate and record and expose before commencement of Works	Sum	3			
2.00		8.8.5	(b) Tri-gonometrical survey beacons and plot boundary pegs, -protect and re-establish located under item A.52, as ordered, by a Registered Land Surveyor on completion of the Works	Sum	3			
2.01			Dewatering of foundation excavation	Prov Sum	1	R680 000.00		R680 000.00
2.02			Allowance for the provision, installation and continuous operation of adequate pumping units, including piping, power, temporary platforms, honey suckers and any other suitable equipment necessary to ensure that areas of excavations and foundations are dewatered as required for construction purposes (Pumpstation site)	Prov Sum	1	R3 881 004.00		R3 881 004.00
2.03			Allow for geotechnical design of earthworks for the water pump station by a professionally registered geotechnical engineer with the engineering council of South Africa. The earth works design must include soil retention design, methodology, dewatering methodology, construction methodology including detailed construction drawings to be approved by the employers agent on the project .	Prov Sum	1	R450 000.00		R450 000.00
<b>TOTAL FOR SECTION 1 CARRIED FORWARD TO SUMMARY</b>								



**HARRY GWALA DISTRICT MUNICIPALITY**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 2: SITE CLEARANCE**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
2		SANS1200 C	<b>SECTION 2: SITE CLEARANCE</b>				
			<b>SITE CLEARANCE (DAM)</b>				
2.01		8.2.1	Clear and grub the area designated by the Engineer up to 150mm depth	m <sup>2</sup>	4980.00		
	LI	8.2.2	Remove and grub large trees and tree stumps of girth Over and up to				
2.02			over 1m and up to and including 2m	No.	10.00		
2.03			over 2m and up to and including 3m	No.	10.00		
2.04			Over 3m upwards in 1 m steps	No.	10.00		
2.05		8.2.4	Reclear surfaces (provisional) (where ordered by Engineer)	m <sup>2</sup>	600.00		
2.06		8.2.5	Take down existing fences and replace with new fences	m	500.00		
2.07		8.2.7	Dismantle and remove pipelines (not encased in concrete), electricity transmission lines, cables	m	50.00		
2.08		8.2.7	Dismantle and remove pipelines encased in concrete	m	50.00		
2.09		8.2.8	Demolish and remove structures/buildings	Sum	2.00		
2.10		8.2.8	Dismantle steelwork, etc	Sum	5.00		
			<b>SITE CLEARANCE (PUMPSTATION)</b>				
			Clear and grub site and remove any obstruction that may occur and spoil to designated site. Only areas indicated in writing by Engineer must be cleared:				
2.11			Clear and grub including all vegetation for pumpstation footprint up to 150mm depth	m <sup>2</sup>	70.00		
2.12			Transport spoil material to unspecified sites and dump (provisional)	m3km	1000		
2.13			Demolish upperdeck existing walls complete and spoil off site	Sum	1		
<b>TOTAL FOR SECTION 2 CARRIED TO SUMMARY</b>							

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 3: EARTHWORKS**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
3		SANS1200 D	<b>SECTION 3: EARTHWORKS</b>				
		8.3.2	<b>EXCAVATION</b>				
		8.3.2	Bulk Excavation				
			(a) Excavation in all materials				
3.01			- Cut to spoil	m <sup>3</sup>	33499.2		
			(b) Extra - Over item 2 - B.1 for				
3.02			2) Hard rock excavation	m <sup>3</sup>	23449		
			Importing of Materials				
3.03			(a) Extra - Over for importation of type G5 materials from commercial sources compacted to 93% Mod AASHTO	m <sup>3</sup>	3350		
3.04	8.3.4		(c) Dealing with overburden	m <sup>3</sup>	21495		
3.05	8.3.6		Overhaul				
3.06			(a) Limited overhaul within 30km radius of site	m <sup>3</sup>	2792		
3.07			(b) Long overhaul, more than 30 km radius	m <sup>3</sup> . km	3909		
	8.3.10		<b>TOPSOILING</b>				
	8.3.11		<b>GRASSING</b>				
3.08			(i) Kikuyu (cuttings) including maintaining for duration of contract	m <sup>3</sup> .km	3000		
3.09			(ii) Kikuyu (sods) including maintaining for duration of contract	m <sup>3</sup>	3000		
			<b>PREPARING AREAS FOR GRASSING</b>				
3.1	PSD 8.3.14		Scarifying area to receive grassing (horizontal and sloping)	m <sup>2</sup>	3000		
3.11	PSD 8.3.15		Supplying and applying chemical fertilizer at 50 g/m <sup>2</sup> on horizontal and sloping surfaces	m <sup>2</sup>	3000		
3.12	PSD 8.3.16		Fertilizer	t	20		
			<b>ACCOMODATION OF TRAFFIC</b>				
3.13	PSA 8.8.2		Traffic signs for deviation (size and type to be stated)	Sum	20.00		
3.14	PSA 8.8.2		Provision of bypass (See section DM and see Subclause 1.3.3 of Section DM of part 3 of the code)	Sum	0.00		
			<b>RIVER DIVERSION STRUCTURE</b>				
3.15	PSA 8.8.6		River diversion (See Particular Specification: PA)				
3.16	PSA 8.8.6		(a) Construction and removal of temporary river diversion works to facilitate raising and extension of existing wall	Sum	1		
3.17	PSA 8.8.6		(b) Dewatering	Sum	600		
3.18	PSA 8.8.6		(c) Engineered Cut-off	Prov Sum	5	R50 000.00	R250 000.00
3.19	PSA 8.8.6		(d) Payment	Prov Sum	24	R5 000.00	R120 000.00
<b>TOTAL FOR SECTION 3 CARRIED TO SUMMARY</b>							



**DISTRICT MUNICIPALITY**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 4: EARTHWORKS (ROADS, SUBGRADE)**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
4		SANS1200 DM	<b>SECTION 4: ACCESS ROAD</b>				
			<b>SITE CLEARANCE</b>				
4.00		8.2.1	Clear and grub the area designated by the Engineer	m <sup>2</sup>	12000		
4.01		8.2.10	Removal topsoil to nominal depth of 150mm, stockpile and maintain	m <sup>2</sup>	12000		
	LI	8.3.1	Remove and grub large trees and tree stumps of girth Over and up to				
4.02			over 1m and up to and including 2m	No.	10.00		
4.03			over 2m and up to and including 3m	No.	10.00		
4.04			Over 3m upwards in 1 m steps	No.	10.00		
4.05		8.2.4	Reclear surfaces (provisional) (where ordered by Engineer)	m <sup>2</sup>	1200.00		
4.06		8.2.5	Take down existing fences and replace with new fences	m	1550.00		
4.07		8.2.7	Dismantle and remove pipelines (not encased in concrete), electricity transmission lines, cables	m	50.00		
4.08		8.2.7	Dismantle and remove pipelines encased in concrete	m	50.00		
		8.3.3	<b>TREATMENT OF ROAD-BED</b>				
			(a) Road-bed preparation and compaction of material to				
4.09			1) minimum of 93 % mod. AASHTO maximum density	m <sup>3</sup>	2400		
			(b) In-place treatment of road-bed in intermediate or hard rock material by				
4.10			1) ripping	m <sup>3</sup>	2400		
		8.3.4	<b>CUT TO FILL</b>				
4.11			a) Compact to 93 % mod. AASHTO maximum density	m <sup>3</sup>	480		
		8.3.7	<b>CUT TO SPOIL OR STOCKPILE INCLUDING FREEHAUL UP TO 10KM FROM</b>				
4.12			(a) Soft excavations	m <sup>3</sup>	2400		
4.13			(b) Intermediate excavations	m <sup>3</sup>	480		
4.14			(c) Hard excavations	m <sup>3</sup>	240		
4.15		8.3.13	<b>SURFACE FINISHES</b>				
4.16			Topsoiling	m <sup>2</sup>	3		
4.17			Grassing	m <sup>2</sup>	3		
		SANS1200 ME	<b>SUBBASE</b>				
4.18		8.3.3	Construct the G7 gravel wearing course with material from commercial sources or designated borrow areas, compacted to minimum of 95 % mod. AASHTO maximum density	m <sup>3</sup>	2400		
<b>TOTAL FOR SECTION 4 CARRIED TO SUMMARY</b>							

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 5: EARTHWORKS**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
5		SANS1200 D	<b>SECTION 5: EARTHWORKS ( PUMPSTATION )</b>				
		8.3.2	<b>EXCAVATION</b>				
		8.3.2	Bulk Excavation including slop stabilisation or wall supports as deep as 6m				
			(a) Excavation in all materials				
5			- Cut to spoil	m <sup>3</sup>	4320		
			(b) Extra - Over item 2 - B.1 for				
			1) Intermediate material	m <sup>3</sup>	2592		
5.01			2) Hard rock excavation	m <sup>3</sup>	1728		
			Importing of Materials				
5.02			(a) Extra - Over for importation of type G5 materials from commercial sources compacted to 93% Mod AASHTO	m <sup>3</sup>	864		
5.03		8.3.4	(c) Dealing with overburden	m <sup>3</sup>	280		
5.04		8.3.6	Overhaul				
5.05			(a) Limited overhaul within 30km radius of site	m <sup>3</sup>	40		
5.06			(b) Long overhaul, more than 30 km radius	m <sup>3</sup> . km	7200		
			<b>IMPORTING OF MATERIAL</b>				
			<b>Import the following material from commercial sources and compact</b>				
5.07			(a) 150mm layer of imported G6 or better quality material, stabilised with 4% cement and compacted to 95% Mod AASHTO	m <sup>3</sup>	200		
			<b>BACKFILLING FOR THE SUMP</b>				
			<b>Excavate from stockpile and compact backfill behind tank wall:</b>				
5.08			Backfill behind walls in 150mm layers and compact to 90% Mod AASHTO	m <sup>3</sup>	200		
			<b>ADDITIONAL LATERAL SUPPORT</b>				
5.09			Battering slope of 1:1 as when directed or required	Sum	10		
5.10			Grassing (Kikuyu instant lawn on slope of 1:1)	m <sup>2</sup>	400		
		8.3.10	<b>TOPSOILING</b>				
		8.3.11	<b>GRASSING</b>				
5.11			(i) Kikuyu (cuttings) including maintaining for duration of contract	m <sup>3</sup> .km	2500.00		
5.12			(ii) Kikuyu (sods) including maintaining for duration of contract	m <sup>3</sup>	2500.00		
			<b>PREPARING AREAS FOR GRASSING</b>				
5.13		PSD 8.3.14	Scarifying area to receive grassing (horizontal and sloping)	m <sup>2</sup>	2500.00		
5.14		PSD 8.3.15	Supplying and applying chemical fertilizer at 50 g/m <sup>2</sup> on horizontal and sloping surfaces	m <sup>2</sup>	2500.00		
5.15		PSD 8.3.16	Fertilizer	t	20		
			<b>ACCOMODATION OF TRAFFIC</b>				
5.16		PSA 8.8.2	Traffic signs for deviation (size and type to be stated)	Sum	20.00		
5.17		PSA 8.8.2	Provision of bypass (See section DM and see Subclause 1.3.3 of Section DM of part 3 of the code)	Sum	0.00		
<b>TOTAL FOR SECTION 5 CARRIED TO SUMMARY</b>							

**HARRY GWALA DISTRICT MUNICIPALITY**

**CONTRACT HGDM 823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**SECTION 6: CONCRETE DAM ( STRUCTURAL)**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
6		SANS 1200 G	SECTION 5: CONCRETE ( STRUCTURAL)				
		8.1.3	CONCRETE				
		8.4.2	Blinding layer in 20 MPa/40 mm concrete 100 mm thick	m <sup>2</sup>	550		
6.01		8.4.3	Reinforced concrete for Monk Tower				
6.02			Strength concrete: 35 MPa/19mm				
		8.1.3	Base	m <sup>3</sup>	300		
6.03		8.1.3	Walls	m <sup>3</sup>	250		
		8.4.3	Precast concrete boards	m <sup>3</sup>	20		
6.04		8.3	Reinforced concrete for valve chamber	m <sup>3</sup>	50		
			Strength concrete: 35 MPa/19mm				
6.05		8.1.3	Base	m <sup>3</sup>	20		
6.06		8.1.3	Walls	m <sup>3</sup>	30		
		8.1.3	Reinforced concrete for stilling basin				
6.07			Strength concrete: 35 MPa/19mm				
6.08		8.4.1	Base	m <sup>3</sup>	495.6		
6.09		8.1.1	Walls	m <sup>3</sup>	13.2		
6.1			End sill	m <sup>3</sup>	22.8		
		8.2.2	Reinforced concrete for training wall				
			Strength concrete: 35 MPa/19mm				
6.11			Walls	m <sup>3</sup>	150		
6.12			Strength concrete: 25 MPa/19mm of steps cast on concrete	m <sup>3</sup>	50		
			ROUGH FORMWORK (DEGREE OF ACCURACY III)				
		8.2.5	Rough formwork to sides				
6.13		8.2.4	Bases	m <sup>2</sup>	300		
6.14			Chamber walls internal and external	m <sup>2</sup>	150		
6.15			Sides of steps	m <sup>2</sup>	50		
			SMOOTH FORMWORK (DEGREE OF ACCURACY I)				
		8.1.1.2	Smooth formwork to sides				
6.16			Internal walls of the monk tower	m <sup>2</sup>	102		
6.17			External walls of the monk tower	m <sup>2</sup>	117		
6.18			Training walls (all sides)	m <sup>2</sup>	330		
6.19		8.2.6	Side walls (all sides)	m <sup>2</sup>	27		
			Box Out Holes/Form Voids				
6.2			For lengths not more than 500mm (incl. voids for gratings/covers)	m <sup>2</sup>	1		
		8.4.4	CONCRETE CUBE-TESTING				
6.21			Prepare set of three 150 x 150 x 150mm concrete strength test cubes, label and send to an approved laboratory for testing, pay all charges and submit report to the Regional Representative. Only successful tests will be paid for.	No	200		
<b>Total Carried Forward</b>							

SECTION 1: GENERAL							
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY		
<b>Brought Forward</b>							
		<b>8.5</b>	<b>JOINTS</b>				
6.22			Type A Joint, between floor/wall panels complete with all components, including the waterstop as per details	m	300		
6.22			Type B Joint, between floor/wall panels complete with all components,	m	300		
		<b>8.7</b>	<b>GROUTING</b>				
6.23			Up to 30mm thick 10MPa non-shrink grout	m <sup>2</sup>	300		
		<b>8.8</b>	<b>HD BOLTS</b>				
6.24			Provide and install .... HD bolts to details given on dwg. No.	t	10		
6.25			Finishing top surfaces of concrete smooth with a wood float:	m <sup>2</sup>	300		
			<b>Manhole steps</b>				
6.26			Cast iron steps	No	20		
			<b>Manhole covers</b>				
6.27			1500x1500mm Cast iron manhole cover and frame to conform with SANS 1115 fixed	No	3		
6.28			Manhole cover for valve chamber by Interlock systems	No	1		
		<b>8.1.2</b>	<b>REINFORCEMENT</b>				
			<b>Mild steel reinforcement to structural concrete work</b>				
6.29	8.1.2.2		From 8mm Diameter to 16mm Diameter bars	t	35		
6.3	8.1.2.3		<b>High tensile steel reinforcement to structural concrete work</b>				
			From 8mm Diameter to 32mm Diameter bars	t	75		
6.31	8.3.2		<b>High-tensile welded mesh reinforcement</b>				
			All Type reference standard sheets	t	1		
			<b>STEEL DOWELS</b>				
6.32			Dowel bar, with length not more than 2000mm, post installed on existing concrete, with Hilti HIT-RE 500 V3 installation per ETA 20/0125, Hammer drilling, using an injection piston plug.	t	1		
			<b>CONVENTIONAL VIBRATED CONCRETE: Dam Wall</b>				
6.33			i) Ogee Section	m <sup>3</sup>	2898.5		
			ii) NOC Section	m <sup>3</sup>	7590		
			<b>WATERSTOPS, JOINTING AND BEARINGS</b>				
6.34			Waterstops: 350 mm Centre Bulb rubber waterstop	m	150		
6.35			Hydrophilic water stops	m	300		
6.36			50mm diameter pressure relieve pipes between old and new concrete	m	281		
			<b>WATER LEVEL MONITORING</b>				
6.37			As per drg J000113-LA-3001	Sum	1		
<b>TOTAL FOR SECTION 6 CARRIED TO SUMMARY</b>							

**HARRY GWALA DISTRICT MUNICIPALITY**  
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**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SCHEDULE 7: CONCRETE (STRUCTURAL)**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
		<b>SANS</b>	<b>CONCRETE (STRUCTURAL)</b>				
		<b>1200 GA</b>	<b>Construction of Raw Water Pump Station</b>				
			<b>SCHEDULED FORMWORK ITEMS</b>				
			Smooth				
7.01			(a) Horizontal	m <sup>2</sup>	450.00		
7.02			(b) Vertical	m <sup>2</sup>	180.00		
			(c) Slab Soffit	m <sup>2</sup>	80.00		
7.03		8.2.5	Narrow widths (up to 300 mm wide)	m	400.00		
		8.2.6	Box out holes/form voids				
			(b) Small, other than circular, of area up to and including 0.1 m <sup>2</sup> Over and up to and including				
7.04			(i) 0 - 0.5m deep	No	18		
			<b>Vertical narrow widths up to 600 mm wide</b>				
7.05			Upstand/downstand beams	m	60		
7.06			Plinths	m	60		
7.07			Columns	m <sup>2</sup>	90		
7.08			Side of ventilation hole	m <sup>2</sup>	15		
		8.3	<b>SCHEDULED REINFORCEMENT ITEM</b>				
			<b>Mild steel bars:</b>				
7.09		8.3.1	Diameters 8 mm to 25 mm: average price for manholes	t	18		
			<b>High-tensile steel bars</b>				
7.10		8.3.2	High-tensile steel bars	t	548		
7.11		8.3.2	High-tensile welded mesh	m <sup>2</sup>	548		
		8.4	<b>SCHEDULED CONCRETE ITEMS</b>				
7.12		8.4.2	Blinding layer (15/19) in 50mm concrete (Chamber floors)	m <sup>2</sup>	293		
7.13		8.4.3	Strength concrete, Grade 25MPa	m <sup>3</sup>	278		
		8.4.4	Unformed surface finishes				
7.14			(a) Wood-floated finish	m <sup>2</sup>	293		
7.15			(b) Steel-floated finish	m <sup>2</sup>	293		
		8.5	<b>JOINTS</b>				
			Polyurethane joint sealer				
7.16			(a) 10mm thick openings between precast slabs to be filled with an approved polyurethane sealer	m	63		
			Bitumen filler				
7.17			(a) Seal around pipe with bituminous roofing felt type 4D and bitumen filler	m	63		
			<b>CONCRETE CUBE-TESTING MACHINE</b>				
7.18			Testing of concrete cubes sets	No	48		
<b>TOTAL FOR SECTION 7 CARRIED TO SUMMARY</b>							



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**SECTION 8: STRUCTURAL STEELWORK**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
8		SANS 1200 H	SECTION 8: STRUCTURAL STEELWORK				
		8.1.3	STRUCTURAL STEEL BEAMS AND COLUMNS				
		8.4.2	Welded columns and beams in single lengths with or without flat section base, top, stiffener and connection plates bolted to either steel member or concrete				
8.01		8.4.3	152x152x37-UC	t	5		
		8.4.3	<b>PAINTING TO STRUCTURAL STEELWORK</b>				
			Prepare surface with mechanical wire brush to St3 and apply sigma-cover 280 primer to obtain a minimum dry film thickness of 50 micron shop applied, one intermediate coat sigma-cover 435 to a minimum dry film thickness of 80 micron site applied and a final coat sigmadur 550 to obtain a minimum dry film thickness of 50 micron site applied, strictly in accordance with the manufacturers specifications and instructions				
8.02		8.4.3	General surfaces of structural steelwork	m <sup>3</sup>	18		
			<b>BOLTS, FASTNERS, ETC</b>				
		8.4.3	<b>Bolts to columns, beams, angles, etc</b>				
8.03			M16 grade 8.8 bolts	No	16		
			<b>STEEL WORK SUNDRIES</b>				
8.04			Stainless steel industrial handrails stanchion tube 44.5mm OD handrail tubing 31.8mm OD fixed to TC wall with type MT90 base plate and stainless steel M16 HVA HILTI bolts with HUV adhesive or similar approved	m	92		
<b>TOTAL FOR SECTION 8 CARRIED TO SUMMARY</b>							

**HARRY GWALA DISTRICT MUNICIPALITY**  
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**SECTION 9: MEDIUM-PRESSURE PIPELINES**

ITEM NO	LI	PAYMENT	SHORT DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
9		SABS 1200 L	<b>SECTION L: MEDIUM PRESSURE PIPELINES</b>				
		8.2.1	<b>OUTLET STRUCTURE VALVES AND FITTINGS</b>				
9.01			Note: The cost of cutting of pipes for specials and valves is to be allowed for in those items .Supply , handle, join, lay, bed, disinfect and test pipes .				
9.02			(1) 200mm NB x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded one end steel pipe with cement mortar internal linings and external Sintakote II coating, butt welded:	No.	2		
9.03			(2) 200mm NB x 45° bend x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded both end steel pipe with cement mortar internal linings and external Sintakote II coating, butt welded:	No.	1.00		
9.04			(3) 200mm NB x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded both ends steel pipe with cement mortar internal linings and external Sintakote II coating, butt welded:	No.	2		
9.05			(4) 200mm NB x 45° bend x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded one end steel pipe with one end flanged (drilled to SANS 1123 Table 1600/3) , cement mortar internal linings and external Sintakote II coating, butt welded:	No.	1		
9.06			(5) Wedge gate valve - PN 25 rated-hand wheel operated-anticlockwise closing-epoxy coated-non-rising spindle-epoxy coated-Double flanged and drilled to SANS 1123 Table 1600/3	No.	1		
9.07			(6) 200mm dia. Viking Johnson or similar approved flange adaptor for mild steel pipes (VJ) PN25	No.	2		
9.08			(7) 200mm NB x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA , one end steel pipe with one end flanged (drilled to SANS 1123 Table 1600/3) the other cut to suite on site , cement mortar internal linings and external Sintakote II coating:	No.	1		
9.09			(8) Vaccum valve Pn 25	No.	1		
9.1			(9) 200mm NB x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded one end steel pipe with one end flanged (drilled to SANS 1123 Table 1600/3) , cement mortar internal linings and external Sintakote II coating, butt welded: Puddle flanged as indicated	No.	1		
9.11			(10) 200mm NB x 90° bend x 6mm thick Strainght pipe, SABS 719 Grade X42/300 WA Spirally welded both end steel pipe with cement mortar internal linings and external Sintakote II coating, butt welded:	No.	1		
9.12			(11) 600mm NB x 6mm thick bellmouth pipe, SABS 719 Grade X42/300 WA Spirally welded one end steel pipe with cement mortar internal linings and external Sintakote II coating, butt welded:	No.	1		
		8.2.1	<b>DRAIN PIPE</b>				
9.13			75mm drainage pipe 9m long	No	1		
<b>TOTAL FOR SECTION 9 CARRIED TO SUMMARY</b>							

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**CONSTRUCTION OF KEMPSDALE DAM WALL**

**SECTION 10: MECHANICAL & ELECTRICAL ( MECHANICAL)**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
10		SANS 1200 L	MEDIUM-PRESSURE PIPELINES				
		8.2.5	SUPPLY AND INSTALL PIPES, VALVES AND SPECIALS				
			Steel X42, PN 25, fittings				
10.1			Item 1 - 400 NB, 90 deg bend , both ends flanged PN25	No	2		
10.02			Item 2 - 400 x 250 NB, SPECIAL 45° UNEQUAL LATERAL TEE, FLANGED , PN25	No	1		
10.03			Item 3 - 400 NB, STRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. PN 25	No	4		
10.04			Item 4 - 400 NB, STRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. PN25	No	1		
10.05			Item 5 - 400x 250 NB, CONCENTRIC REDUCER, FLANGED. PN25	No	1		
10.06			Item 6 - 250 NB, BUTTERFLY VALVE LEFT HAND ACTUATOR, LEFT HAND PROJECTION ON FLOW DIRECTION, FLANGED. PN25	No	6		
10.07			Item 7 - 250 NB, DISMANTLING FLANGE ADAPTOR. PN 25	No	6		
10.08			Item 8 - 250 NB, STRAIGHT PIPE ONE END FLANGED OTHER PLAIN TO CUT TO SUIT ON SITE. WITH 25mm ND PRESSURE NIPPLE. PN 25	No	3		
10.09			Item 9 - 250 x 200 NB, ECCENTRIC REDUCER, FLANGED. PN 25	No	3		
10.1			Item 10,1 - OMEGA 200-670A	No	1		
10.11			Item 10,2 - Baseplate non-std	No	1		
10.12			Item 10,3 - Coupling: A 280	No	1		
10.13			Item 11 - 400KW 4P 380V B3 WEG CI IP66 Motor.	No	1		
10.14			Item 12 - 125 x 250 NB , SECCENTRIC REDUCER, FLANGED. PN25	No	3		
10.15			Item 13 - 250 NB, STRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. WITH 25mm ND PRESSURE NIPPLE. PN 25	No	3		
10.16			Item 14 - 250NB ,NON-RETURN VALVE. PN25	No	3		
10.17			Item 15 - 250NB, DISMANTLING JOINT COUPLING. PN25	No	3		
10.18			Item 16 - 250NB ,STRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. PN25	No	1		
10.19			Item 17 - 250 NB, 45° SEGMENTED BEND, FLANGED. PN25	No	2		
10.2			Item 18 - 350NB , STRAIGHT PIPE ONE END FLANGED, THE OTHER PLAIN FOR CUTTING AND WELDING TO SUIT ON SITE. PUDDLE FLANGE AS SHOWN. PN25	No	1		
10.21			Item 19 -350 NB, FLANGE ADAPTOR . PN25	No	1		
10.22			Item 20 - 350NB, WEDGE GATE VELVE, FLANGED. PN 25	No	1		
10.23			Item 21 -350 x 250 NB, 45° UNEQUAL LATERAL TEE, FLANGED . PN 25	No	1		
10.24			Item 22 - 350NB, STRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. PN 25	No	1		
10.25			Item 23 - 350NBSTRAIGHT PIPE ONE END FLANGED, OTHER PLAIN TO WELD TO LOOSE FLANGE ON SITE AS INDICATED. PN 25	No	1		
10.26			Item 24 - 250 x 350NB, CONCENTRIC REDUCER, FLANGED. PN 25	No	1		
10.27			Item 25 - 350 x 350 x 350 NB, EQUAL TEE FLANGED. PN25	No	1		
10.28			Item 26 - 80NB,SPECIAL REDUCER: BLANK FLANGE WITH 80mm STUB 250 LONG, WELDED IN THE CENTER OF THE BLANK FLANGE. STUB WITH 3 X 5mm M.S. GUSSET PLATES FITTED AS INDICATED. PN25	No	1		
10.29			Item 27 - 150 x 150 NB,BALL VALVE, FULL PORT FLANGED. PN25	No	1		
10.3			Item 28 - 80 NB,DOUBLE ORIFICE AIR VALVE FLANGED. PN25	No	1		
10.31			<b>SUPPLY AND INSTALL AIRVALVES</b>				
10.32			Supply and installation of double orrifice airvalve fittings 80mm NB	No	3		
<b>Total Carried Forward</b>							



**HARRY GWALA DISTRICT MUNICIPALITY**

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**CONSTRUCTION OF KEMPSDALE DAM WALL**

**SECTION 11: MECHANICAL & ELECTRICAL ( ELECTRICAL)**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
11		SANS 1200 PE	<b>SECTION 11: ELECTRICAL</b>				
11.01			<b>POWER SUPPLY -TRANSFORMER</b>				
			<u>Replace the existing 200kVA transformer with a 630kVA Miniature Substation</u>				
11.02			Decommission the existing 200kVA transformer and cabling and deliver it to the Municipality's stores	Lot	1		
11.03			Supply, install and commission a new 630kVA miniature substation complete with a plinth and 1250A LV MCCB	Lot	1		
11.04			Supply and install MV and LV earthing system for the new mini-sub	Lot	1		
11.05			Supply and install 150mm <sup>2</sup> 4-Core LV armoured cables from the min-sub to the new MCC panel in the pumphouse via the generator ATS	m	420		
11.06			Supply and install 25mm <sup>2</sup> 3-core 11kV XLPE cable	m	40		
11.07			Supply and install outdoor termination kit for 25mm <sup>2</sup> 3 Core XLPE cable including 11kV surge arrestors and line hardware at the terminal pole	Lot	1		
11.08			Supply and install indoor termination kit for 25mm <sup>2</sup> 3 Core XLPE cable	Ea	1		
11.09			Trenching for MV and LV cables	m3	55		
11.10			Supply and install LV cable terminations for 150mm <sup>2</sup> 4-Core LV armoured cable	Ea	32		
			Supply, deliver and install 450mm wide heavy duty steel cable tray with hot dip galvanised finish	m	50		
11.11			Supply external 90° elbow (dropper) cable tray unit	Ea	4		
11.12			Install cable trays and external elbow units vertically against pump room wall (from control room trench dropping down to pump room trench)	Lot	1		
11.13			Supply and install 150mm <sup>2</sup> BCEW	m	210		
11.14			Supply and install 150mm <sup>2</sup> BCEW terminations	Ea	16		
11.15			Supply and install earthing for the pumphouse	Lot	1		
11.16			Supply, install and commission a new 630kVA prime rated, containerised complete with ATS generator set	Ea	1		
11.17			Provision for making good the existing electrical installation in the pumphouse	Lot	1		
11.18			Decommission the existing generator and cabling and deliver it to the Municipality's stores	Lot	1		
11.19			Decommission the existing MCC and cabling and deliver it to the Municipality's stores	Lot	1		
			<b>MOTOR CONTROL</b>				
			<b>400V Motor control centre (MCC) panel for 3x315kW 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)</b>				
11.20			Factory acceptance test	Lot	1		
Total Carried Forward							

SECTION 11: MECHANICAL & ELECTRICAL ( ELECTRICAL)						
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	
Brought Forward						
11.21			Panel manufactured to specification and drawings (incomer panel and MCC panel IP54 RAL 2000)	Lot	1	
11.22			Factory acceptance test	Lot	1	
11.23			Delivered to site and installed into position	Lot	1	
11.24			Site acceptance test	Lot	1	
11.25			Commissioning, by panel manufacturer	Lot	1	
11.26			VSD Supply, deliver, install and commission human interface module (HIM) (door mounted), including choke and EtherNet IP module	Ea	2	
11.27			DOL Supply, deliver, install and commission human interface module (HIM) (door mounted)	Ea	1	
			<b>PLC programming time allowance, PLC Hardware</b>			
11.28			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.	Hour	100	
11.29			1. Supply of PLC, IO Modules and V DC Control Power Supply Equipment. 2. Supply of HMI Screen 3. MCC communication equipment - Supply of Unmanaged Ethernet Switch, Cables, Plugs	Lot	1	
			<b>Local start &amp; emergency stop buttons mounted on pedestal next to motor, combined with a field isolator for 2x315kW motor</b>			
11.30			Supply	Ea	2	
11.31			Install	Ea	2	
			<b>Supply, deliver and install motor terminator for protection against reflective wave impulses on 315kW motors</b>			
11.32			Supply motor terminator	Ea	2	
11.33			Install motor terminator within 3 meters of motor terminals, including all cabling, terminations and auxiliary requirements	Ea	2	
			<b>Supply, deliver and install sensors and switches for control and supervisory purposes</b>			
			<b>Pressure sensor in pipes</b>			
11.34			Supply	Ea	5	
11.35			Delivery to site, off-loading and installation	Ea	5	
			<b>No-flow sensors in pipes at pumps</b>			
11.36			Supply	Ea	2	
11.37			Delivery to site, off-loading and installation	Ea	2	
			<b>Flow Transmitter in outlet pipe</b>			
11.38			Supply	Ea	1	
11.39			Delivery to site, off-loading and installation	Ea	1	
Total Carried Forward						

SECTION 11: MECHANICAL & ELECTRICAL ( ELECTRICAL)							
ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY		
Brought Forward							
			<b><u>Telemetry panel</u></b>				
			<b>Telemetry EtherNet IP, Modbus TCPIP system</b>				
11.40			Supply telemetry system	Ea	1		
11.41			Delivery to site, off-loading and installation	Ea	1		
			<b>SCADA configuration</b>				
11.42			All labour and commissioning required, including all terminations	Lot	5		
			<b>Antenna kit, complete with all brackets and cable connections &amp; terminations</b>				
11.43			Supply antenna kit	Ea	1		
11.44			Delivery to site, off-loading and installation	Ea	1		
			<b><u>Control Cabling</u></b>				
			<b>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):</b>				
			<b>1.0 mm2 2-core Cu 600/1000V PVC/PVC/SWA/PVC LV multi-core control cable (overall screened)</b>				
11.45			Supply	m	200		
11.46			Delivery to site, off-loading and installation	m	200		
			<b>1.5mm<sup>2</sup> 4-core Cu 600/1000V PVC/PVC/SWA/PVC LV control cable</b>				
11.47			Supply	m	60		
11.48			Delivery to site, off-loading and installation	m	60		
			<b>1.0 mm2 4-core Cu 600/1000V PVC/PVC/SWA/PVC LV multi-core control cable (overall screened)</b>				
11.49			Supply	m	100		
11.50			Delivery to site, off-loading and installation	m	100		
			<b>2-core Dekabon Cable (overall screened)</b>				
11.51			Supply	m	100		
11.52			Delivery to site, off-loading and installation	m	100		
			<b>2x120mm<sup>2</sup> 4-core Cu 600/1000V PVC/PVC/SWA/PVC LV Power cable</b>				
11.53			Supply	Ea	200		
11.54			Delivery to site, off-loading and installation	Ea	2		
Total Carried Forward							







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**SECTION 13: PUMP STATION ACCESSORIES AND SUNDRY ITEMS**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
13		PGD	<b>PUMPSTATION ACCESSORIES AND SUNDRY ITEMS</b>				
13.01			Purpose made manhole cover as per the details, complete	No	4		
			<b>Galvanised Mild Steel Access ladders:</b>				
13.02			(a) between the sump and the lower gallery	No	4		
13.03			(b) Between lower galery and the upper gallery	No	2		
			<b>Galvanised Mild Steel 15x40 Expanded mesh complete</b>				
13.04			Over windows sized 1700mm x 1200mm	No	6		
13.05			Over opening sized 500x300mm	No	6		
13.06			Galvanised louvre screen for opening sized 500x300mm	No	6		
13.07			Mild steel ball type handrails installed completely	m	90		
13.08			Make a 400x200mm hole on a 300mm thick reinforced concrete wall	No	5		
13.09			Break reinforced concrete to make a hole through a 300mm thick wall	m2	Rate Only		
13.10			406x140x39 UB GMS I-BEAM, 9300mm long with 20mm bolt in web as stop-end each side, supplied and installed	No	2		
			<b>PROFILED METAL SHEETING AND ACCESSORIES</b>				
13.11			0.6mm Charcoal coated chromadek roof sheeting fixed to frames	m2	600		
			<b>FLASHINGS</b>				
13.12			0,6mm Galvanised sheet iron flashings with "Globalcoat" finish one side, all in strict accordance with the manufacturer's 'instructions				
13.13			Side wall flashing including raking out joints and turning in	m	16		
			<b>TIMBER ROOF CONSTRUCTION</b>				
13.14			The following trusses shall be roof trusses manufactured from sawn S.A. Pine, 7 no. of 50x50mm Purlins on Sisalation "400" on 3 no. 152x38mm Rafters, secured in position with 32mm hoop iron anchors, overhang, purlins, including all necessary connecting plates,nuts, etc; (as per roof plan).	Sum	30		

**TOTAL FOR SECTION 13 CARRIED TO SUMMARY**

**HARRY GWALA DISTRICT MUNICIPALITY**  
**CONTRACT HGDM 823/HGDM/2022**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**  
**SECTION 14: BUILDING WORKS**

ITEM NO	LI	PAYMENT	DESCRIPTION	UNIT	PROJECT SPECIFIC QTY	RATE	AMOUNT
14			<b><u>BUILDING WORKS</u></b>				
			<b><u>PLASTERING</u></b>				
			<b><u>SCREEDS</u></b>				
			<b><u>Screeds wood floated on concrete:</u></b>				
14.01			25mm Thick on floors and landings	m <sup>2</sup>	360		
			<b><u>INTERNAL PLASTER</u></b>				
			<b><u>One coat cement wood floated plaster on brickwork:</u></b>				
14.02			On internal walls	m <sup>2</sup>	368		
14.03			On narrow widths	m <sup>2</sup>	239.2		
			<b><u>DOORS AND WINDOWS</u></b>				
			<b><u>DOORS</u></b>				
14.04			1800 mm x 2400 mm high double steel door frame with louvers	No	6		
14.05			1800 mm x 2697 mm high double steel door frame with a solid timber double door	No	2		
			<b><u>WINDOWS</u></b>				
14.06			956mm x 1022 mm steel window frame including paint and clear glass complete	No	5		
14.07			530mm x 523mm steel window frame including paint and clear glass complete	No	2		
14.08			1022 x 956mm Burglar bar for W1	No	5		
14.09			1000 x 600mm Standard louvre window (L1)	No	5		
			<b><u>PAINTWORK</u></b>				
			<b><u>ON FLOATED PLASTER</u></b>				
			<u>Prepare surfaces and remove all loose material, apply one coat 'Plascon Merit Plaster Primer' and two coats 'Plascon Double Velvet Pure Acrylic' paint:</u>				
14.10			On internal walls.	m <sup>2</sup>	368		
			<b><u>ON WOOD</u></b>				
			<u>Prepare surfaces and remove all loose material, apply one coat 'Plascon Merit Plaster Primer' and two coats 'Plascon Double Velvet Pure Acrylic' paint:</u>				
14.11			On timber doors	m <sup>2</sup>	12		
			<b><u>ON METAL</u></b>				
			<u>Prepare surfaces and remove all loose material, apply one coat 'Plascon Merit Plaster Primer' and two coats 'Plascon Double Velvet Pure Acrylic' paint:</u>				
14.12			On steel windows and grill door, etc.	m <sup>2</sup>	20		
14.13			Supply and installation of Palisade fence and a double lockable gate as per drawing Drg J000108-216 and 217	m	200		
			<b><u>PRECAST SECTIONS</u></b>				
			<u>Supply and installation of Precast concrete manholes for flow meter and pre chlorination chamber</u>				
14.14			560 mm NB Locable Heavy duty Cast iron lid and frame	No.	4		
14.15			1500 x 250 mm mahole ring	No.	4		
14.16			1500 x 500 mm mahole ring	No.	12		
14.17			1500 x 560 mm cover slab	No.	4		
<b>TOTAL FOR SECTION 14 CARRIED TO SUMMARY</b>							

**CONTRACT No. HGDM 823/HGDM/2022**

**CONSTRUCTION OF KEMPSDALE DAM WALL**

**PART C3: SCOPE OF WORK**

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## PART 1: CIVIL SCOPE OF WORKS

### C3.1 STANDARDISED SPECIFICATIONS

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

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

A	1986	:	GENERAL
AA	1986	:	GENERAL - SMALL WORKS
AB	1986	:	EMPLOYER'S AGENT'S OFFICE
AD	1986	:	GENERAL – SMALL DAMS
C	1980	:	SITE CLEARANCE (AS AMENDED 1982)
D	1988	:	EARTHWORKS
DB	1989	:	EARTHWORKS (PIPE TRENCHES)
DE	1984	:	SMALL EARTH DAMS
G	1982	:	CONCRETE (STRUCTURAL)
HA	1990	:	STRUCTURAL STEELWORKS
LB	1990	:	BEDDING - PIPES
L	1983	:	MEDIUM PRESSURE PIPELINES
HC	1988	:	CORROSION PROTECTION FOR STRUCTURAL STEELWORKS

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)
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 1 contains a general description of the works, the site and the requirements to be met.

Part 2 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 Employer's Agent before the execution of the work under the relevant item.



**PROJECT SPECIFICATION: PORTION 1**

**SABS 1200 PS : GENERAL**

**PS-1 PROJECT DESCRIPTION**

**PS-1.1 Employer's Objective**

The Harry Gwala District Municipality is responsible for the provision of safe and reliable potable water supplies to the communities falling under its entire area of jurisdiction. The Harry Gwala District Municipality intends to augment the water supply to Kokstad town by raising the Kempdale Dam Wall at uMzintlava River as a medium-term solution.

**PS-1.2 Overview of the Works**

<b>Contract N°</b>	<b>Description</b>
HGDM 823/HGDM/2022	CONSTRUCTION OF KEMPSDALE DAM WALL

**Under this Contract, Harry Gwala District Municipality intends to implement the,**

**CONSTRUCTION OF THE KEMPSDALE DAM WALL**

## PS-2 EXTENT OF THE WORKS

Under this contract, the successful contractor will be required to undertake the raising of Kempdale Dam with conventional vibrated concrete and earth and construction of associated apertures, and the works comprise the following, but not limited to:

- Site clearing.
- Construction of the earth bank for river diversion.
- Excavation for a stepped spillway, stilling basin and monk structure.
- Excavation for earth embankment on the left.
- Layering of reinforcement for concrete structure.
- Construction of stepped spillway, stilling basin and monk structure.
- Construction of earth embankment.
- Placement of riprap.
- Earthworks for an access road.
- Construction of access road.
- Construction of 200 mm diameter Steel Grade A (SABS 719) – outlet pipeline.
- Pipeline pressure testing.
- Construction of a valve chamber for the outlet works.
- Construction of a water pumpstation capable of delivering a minimum duty point of 80l/s and a head of 150m per group) with associated civil and structural works
- Building works, lighting, paintworks
- Supply, delivery, and installation of all associated electrical and mechanical components
- Supply and installation of cables from existing supply points to a proposed Motor Control Centre (MCC) inside the pumpstation building
- Supply and installation of relevant Eskom Transformer
- Generator- Generator room with appropriate ventilation and diesel storage room
- Rehabilitation and protection of the pump station site (Supply, delivery and Installation of Fencing, gates and locking systems)
- As-built drawings
- Operation manuals and training of operators and staff
- Commissioning and testing of the project

## PS-3 DESCRIPTION OF THE SITE AND ACCESS

### PS-3.1 Access

Kempdale Dam is located, about 6km from Kokstad town, in Kokstad which falls within the Greater Kokstad Local Municipality in KwaZulu Natal. Kokstad town is serviced by a regional road (R56) of the national route (N2) in southern KwaZulu Natal. Greater Kokstad LM is one of the five local municipalities that constitute Harry Gwala District Municipality. It is bordered by Matatiele Local Municipality to the west of, Dr Nkosazana Dlamini to the north, eastern of Umizwabantu Local Municipal to the south-east and Eastern Cape to the east in Ugu District Municipality.

### PS-3.2 Limitations

The following limitations characterise the site of the dam construction

The Contractor will be required to ensure that the insurances for the works cover any damage that may occur to properties and works as a result of construction activities. Should there be any claims against the contractor resulting from construction activities, the Employer's Agent will ensure that these have been addressed or the damages rectified prior to the release of the retention held on the contract.

**PS-4 NATURE OF GROUND AND SUBSOIL INVESTIGATIONS**

RWBE Geotechnical Drilling was the appointed Geotechnical Consultant who drilled 8 Core bore holes. Bore holes 1, 2, 3, and 4 were drilled on the left-hand side of the dam wall and bore holes 5, 6, 7, and 8 were drilled on the right-hand side of the dam wall along the quarry. The Geotechnical report and drawings is available upon request. The findings of the 8 boreholes showed the following:

- BH1 – Bore hole 1 was drilled till 8,38m. Very weak dolerite was first found at 3m deep and the very strong dolerite was first found at 6,5m deep.
- BH2 - Bore hole 2 was drilled till 6,37m. Very weak dolerite was first found at 2,5m deep and the very strong dolerite was first found at 3m deep, however medium strong dolerite was then found after the strong dolerite from 5,5m to 6,37m.
- BH3 - Bore hole 3 was drilled till 6,29m. Very strong dolerite was first found at 1,5m deep and continued to 6,29m.
- BH4 - Bore hole 4 was drilled till 8,38m. Very weak dolerite was first found at 2m deep and continued to 7m deep. Medium strength dolerite was then found at 7m deep and the very strong dolerite was first found at 8,7m deep.
- BH5 - Bore hole 5 was drilled till 10,34m. Very strong dolerite was first found in the beginning of the drilling right till the end.
- BH6 - Bore hole 6 was drilled till 12,16m. Very strong dolerite was first found at 0,7m right till the end. It was noted that there was a very high water loss above 5,5m which is possibly due to the previously blasting method used for quarrying.
- BH7 - Bore hole 7 was drilled till 10,03m. Very strong dolerite was first found at 2,7m deep. It was noted that there was a very high water loss above 7,5m which is possibly due to the blasting of the quarry.
- BH8 - Bore hole 8 was drilled till 6,42m. Very strong dolerite was first found in the beginning of the drilling at 0,3m right till the end.

**PS-5 EMPLOYER’S AGENTING AND DESIGN**

**PS-5.1 Design Services and Activity Matrix**

The following matrix of responsibilities for design of permanent and temporary works will apply:

<b>Activity</b>	<b>Responsible Party</b>
<b>Work designed by, per design stage</b>	
Concept, feasibility, and overall process	Employer
Basic Employer’s Agenting and detail layouts to tender stage	Employer
Final design approved for construction stage	Employer
Temporary works	Contractor
Permanent Works	Contractor
Preparation of as built drawings	Employer/Employer’s Agent/Contractor

**PS-5.2 Employer’s Design**

The Employer’s design will be for all permanent works and will be detailed in the drawings, site instructions and, the technical specifications to which will be issued with the tender documents and issued as well as during construction.

**PS-5.3 Design Brief**

The contractor will be responsible for design of the following (which are all subject to approval by the Employer’s Agent):

- Site layouts for the contractor’s camp and office accommodation
- Site layouts for the Employer’s Agent Representative’s temporary office accommodation

- Construction Methodology
- River diversion
- Formwork
- All other temporary works
- Concrete Mix designs

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No additional payments will be certified to cover these activities.

#### **PS-5.4 Drawings**

The following drawings will be required to be prepared by the contractor as a minimum:

- Site layouts for the contractor's camp and office accommodation
- Site layouts for the Employer's Agent Representative's temporary office accommodation
- Site layouts for river diversion strategies
- Contractor's Accommodation of Traffic plan

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

The tender drawings are applicable to the contractor are detailed in Part C5 of these documents. These drawings have been used for setting up the Bills of Quantities.

#### **PS-5.5 Design Procedures**

The contractor will be required to furnish the following designs for approval by the Employer's Agent at the indicated times:

- Site layouts of the Contractor's camp and office accommodation – within 14 days from commencement date of the contract and in any case prior to the erection of the contractor's camp and offices
- Layouts for the Employer's Agent's representative office – within 14 days from commencement date of the contract and in any case prior to the erection of the Employer's Agent's Representative's temporary office premises.
- River diversion strategy – within 14 days of prior to the commencement of relevant works.
- Formwork design – within 14 days of prior to the commencement of relevant work.
- Scaffolding and all staging work – within 14 days of prior to the commencement of relevant work.
- Concrete Mix Designs for all classes of concrete as measured in the Schedule of Quantities 14 days prior to the placement of any concrete work.
- Contractor's "Accommodation of Traffic Plan" within 14 days from the Commencement Date. Refer to PS 11

The costs of the designs will be deemed to have been included in the scheduled items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

#### **PS-5.6 Interface with other Contractors**

The contractor may be required to provide access to other contractors undertaking work as per parallel contracts. The costs of this interface will be deemed to have been allowed for in the appropriate items in the Schedule of Quantities. No other additional payments will be certified to cover these activities.

## **PS-6 CONSTRUCTION AND MANAGEMENT REQUIREMENTS**

### **PS-6.1 General**

The Contractor is referred to SANS 1921: 2004: Construction and Management Requirements for Works Contracts, Part 1: General Employer's Agenting and Construction Works, and Part 2: Accommodation of Traffic on Public Roads. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all requirements relevant to the project.

Certain aspects however require further attention as described hereafter.

### **PS-6.2 Quality Assurance (QA)** *(Read with SANS 1921 – 1: 2004 clause 4.4)*

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Employer's Agent. To this end it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Employer's Agent will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Employer's Agent or the Employer's Agent's representative to act as the Contractor's Quality Assurance Officer, foreman or surveyor.

The Contractor shall submit his Quality Control Plan within 14 days from the Commencement Date

### **PS-6.3 Management and disposal of water** *(Read with SANS 1921-1: 2004 clause 4.6)*

The Contractor shall pay special attention to the management and disposal of water and stormwater 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, seep and surface water, will not be considered.

### **PS-6.4 Works adjacent to services and structures** *(Read with SANS 1921-1: 2004 clause 4.8)*

The Contractor shall execute works on or adjacent to railway lines, pipelines, roads, cables and the like in accordance with the requirements of the authority responsible for the operation and maintenance of these structures.

### **PS-6.5 Disposal of spoil or surplus material** *(Read with SANS 1921-1: 2004 clause 4.10)*

The Contractor shall dispose all surplus and unsuitable material in legal spoil areas as agreed with the client. The Contractor shall be responsible for all arrangements necessary to obtain such spoil sites.

### **PS-6.6 Testing** *(Read with SANS 1921 – 1 : 2004 clause 4.11)*

#### **PS-6.6.1 Process control**

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Employer's Agent. It is preferred that the laboratory is a SANAS accredited laboratory otherwise the Contractor shall ensure that the laboratory is managed in terms of SANS 17025

The Contractor may establish his own laboratory on site, or he may employ the services of an independent commercial laboratory. Whatever method is used, the Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Employer's Agent. 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. The Contractor shall insure that the laboratory is managed in terms of SANS 17025

**PS-6.6.2**     Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Employer's Agent for acceptance control. However, before accepting any work, the Employer's Agent may have further control tests carried out by a laboratory of his choice. The cost of such additional tests will be covered by a provisional sum provided in the schedule of quantities, but tests that failed to confirm compliance with the specifications, will be for the account of the Contractor.

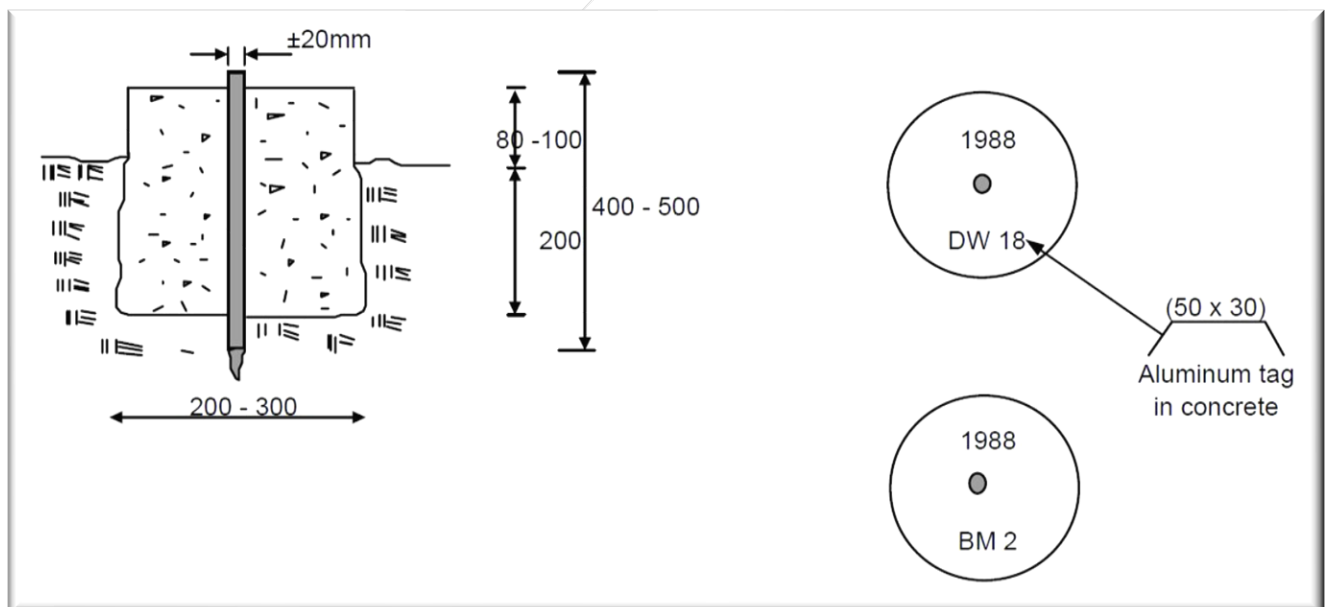
**PS-6.7 Survey beacons**     *(Read with SANS 1921 - 1: 2004 clause 4.15)*

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as benchmarks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

Existing topographical benchmarks are available as provided in **Table 1**. At least 3 additional construction benchmarks must be constructed. These benchmarks must be visible from each benchmark after construction. These construction benchmarks must be as in **Figure 1** and the concrete constructed with concrete in the proportion of 1 (Cement) : 3 (river sand) : 2 (10 aggregates) on a volume base.

**Table 1: Existing topographical benchmarks**

Notation	Y	X	Z	Description
BM1	-43610.870	3379376.500	1277.620	16mm Round Iron Peg in Concrete
BM2	-44007.910	3379333.590	1294.922	16mm Round Iron Peg in Concrete
BM3	-44110.270	3379411.930	1293.875	16mm Round Iron Peg in Concrete



**Figure 1: Required permanent bench marks**

**PS-6.8 Existing Services**     *(Read with SANS 1921 - 1: 2004 clause 4.17)*

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

**PS-6.9 Management of the environment** (Read with SANS 1921 - 1: 2004 clause 4.19)

The Contractor shall pay special attention to the following:

(a) Natural Vegetation

The Contractor shall confine his operation to as small an area of the site as may be practical for the purpose of constructing the works.

Only those trees and shrubs directly affected by the works and such others as the Employer's Agent may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Employer's Agent.

(b) Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire, the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

**PS-6.10 Overhaul**

No payment will be made for overhaul on this contract unless provision is made thereof in specific items.

**PS-6.11 Excavations**

Due to the depths of sewer lines and their location nets to a water course, the Contractor is to allow in their tendered rates for excavation, for shoring and protection of trenches. No additional payment will be made for protection of excavations for whatever reason.

**PS-6.12 Security**

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

**PS-7 CONSTRUCTION PROGRAMME**

**PS-7.1 Preliminary programme**

The Contractor shall include with his tender a preliminary programme on the prescribed form 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.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his 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.

In determining his construction programme, the contractor should allow for disruptions/stoppages/requirements and intermittent "hold" of work while awaiting Employer's Agent's inspections at the following critical stages:

Stage	Delay
Excavation works	2 days
Access road preparation	1 day
Prior to completing the river diversion earth embankment	1 day
Prior to pouring of concrete	2 days
Following preparation of bedding and laying of pipes and prior to backfilling	1 day
Prior to commencement of testing of gravity spillway	1 day
Prior to testing of outlet works	1 day

The contractor must take into account the above requirements when pricing and preparing the programme of works. No additional payments, other than through scheduled items, will be made for these stoppages/disruptions/constraints.

**PS-7.2 Programme in terms of Clause 5.6 of the 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, 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 5.7.1 of the General Conditions of Contract 2015.

The Contractor shall indicate a clear critical path on his programme

**PS-8 SITE FACILITIES AVAILABLE**

**PS-8.1 Contractor's camp site and depot** (Read with SANS 1921 - 1 : 2004 clause 4.14)

The Contractor will be permitted to locate his offices, storage facilities, workshops, latrines, etc, on a site approved by the Employer's Agent, in liaison with the land owner and community.

Temporary buildings and fencing are to be neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition. The Contractor must not cut down or damage any trees nor make any excavation without the written permission of the Employer's Agent and will be required to restore the site to its original condition on completion of the Works.

All buildings and latrines shall be in accordance with the Local Authority and State Health regulations and shall be kept in a clean, sanitary condition to the satisfaction of the Employer's Agent. The total contractor's site can only be 60m x 60m.

**PS-8.2 Accommodation of Employees**

No employees except for security guards will be allowed to sleep or be accommodated on the site.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities must be provided.



### **PS 8.3 Source of Water Supply**

The Contractor shall make his own arrangements for the supply of water for construction purposes and the water in the Kempdale Dam could be an option. The source of water shall be subject to the approval of the Employer's Agent.

The Water Services Authority in the area is Harry Gwala District Municipality. Should the contractor's source of water be the Harry Gwala District Municipality, the contractor will be required to ensure that the water account with the Harry Gwala District Municipality is in good standing prior to the issue of completion certificate. The Employer's Agent will withhold any payments until arrears are cleared with The Harry Gwala District Municipality.

### **PS 8.4 Source of Power Supply**

The power supply authority is Eskom. The Contractor will be required to make his own arrangements with, and pay all the requisite connection and consumption charges to Eskom for whatever temporary power supplies he/she may require for his use on the site and his tender will be held to include for all such costs and charges.

## **PS-9 SITE FACILITIES REQUIRED**

### **PS-9.1 Facilities Required for the Employer's Agent**

#### **PS 9.1.1 Temporary/Permanent Offices**

The Contractor is to provide a temporary office for use by the Employer's Agent. The offices should be able to accommodate one full time Employer's Agent's Representative and two assistants.

- The Employer's Agent's offices are to be equipped as per PSA : General.

The Contractor should also make arrangements for covered facilities to enable the accommodation of approximately 12– 16 people during progress site meetings, to be held fortnightly or monthly.

***The facilities are to be provided, to the satisfaction of the Employer's Agent, within 14 days of commencement date. Should the contractor fail to provide approved establishment within the stipulated 14 days, the contractor will pay a penalty calculated as follows:***

- Mileage of the Employer's Agent's Representative from other offices from the nearest business centre to site and back to office at R5.00/km
- Rented Office space equivalent to that stipulated in this contract at offices in Kokstad or other place closer to the site.

This penalty shall be deducted from the Contractor's payment certificates and paid to the service provider providing the site office of the specification as detailed above.

#### **PS 9.1.2 Laboratory Facilities**

The Contractor will not be required to provide a testing laboratory on site for use by the Employer's Agent. However, the contractor will be required to provide:

- compaction test results for all backfilling at embankment and roads from a recognised laboratory. No additional payment will be made for the compaction tests and the contractor is to allow for the costs thereof in the tendered rates.
- concrete test results for all placed concrete as per SANS 1200. This concrete laboratory must be accessible for the Employer's Agent.
- Refer to PS 6.6

#### **PS 9.1.3 Sanitary Facilities**

All latrines shall conform to the requirements of the Local Authority and shall be subject to approval by the Employer's Agent. All sanitary fees and charges due under the Local Authority or State Health Regulations or bylaws shall be paid by the Contractor. Throughout the progress of the contract, all latrines shall be maintained by the Contractor in a clean, sanitary condition to the satisfaction of the Employer's Agent.

**PS 9.1.4 Telephone Facilities**

The Contractor will not be required to provide according to PSA. The contractor will be required to cover cellphone costs for the Employer's Agent's site staff for airtime valued at R150/week. Appropriate items have been provided in the Schedule of Quantities to cover these costs.

**PS 9.1.5 Housing Facilities**

The Contractor will not be required to provide housing facilities for the Employer's Agent's staff. However, a provisional sum has been provided in the schedule of quantities for payment through the contract for accommodation for the Employer's Agent's staff.

**PS 9.1.6 Parking Facilities**

The Contractor will be required to provide three covered parking bay for the Employer's Agent.

**PS 9.1.7 Employer's Agent's Transport**

The Contractor will not be required to provide transport for the Employer's Agent's staff.

**PS 9.1.8 Security**

The Contractor will be responsible for providing adequate security for the Works and for the site establishment. All costs associated with the provision of security staff shall be borne by the Contractor and should allowed for in the rates tendered for items in the Schedule of Quantities. No additional payments will be made for security measures taken during the contract period, other through the schedule items in the Schedule of Quantities.

**PS 9.1.9 Contract staff to assist the Employer's Agent**

The following staff will be recruited by the contractor to assist the Employer's Agent in carrying out his services:

Description of Staff	N° Required	Remarks
Environmental Monitoring	One	Provisional sum provided for appointment as directed by the Employer's Agent. Personnel directed by and report to Employer's Agent
Occupational Health & Safety Monitoring	One	
Community Liaison Officer	One	

The required personnel will be identified by the Employer's Agent and will report to the Employer's Agent. Provisional Sums and the relevant mark-up Items are provided for in the Schedule of Quantities to cover these costs.

**PS 9.1.10 Survey Equipment**

The contractor shall provide the following survey equipment, in good condition, for use by the Employer's Agent throughout the duration of the contract:

- A dumpy level, staff and tripod
- Measuring tape

- An assistant, when required, to assist the Employer's Agent to operate survey equipment, when provided.

## **PS 10. EXISTING SERVICES**

### **PS 10.1 Care, Damage and Protection**

Known services will be indicated in the tender and contract documents. The Contractor will be responsible for identifying all services with the relevant Service Providers.

The Contractor shall familiarize himself with all services and expose them at the start of the Contract to verify their position and establish their depths.

No additional payment will be made to the Contractor for identifying and locating services. Therefore, the Contractor will have to include the costs thereof in the scheduled items in the Schedule of Quantities.

Any information regarding existing services is given in good faith and without guarantee.

### **PS 10.2 Blasting**

No blasting will be permitted unless the Contractor can satisfy the Employer's Agent that his proposed blasting methods and controls are such that no damage will be caused to the adjoining concrete embankment, building structures, pipelines or services. Other methods of excavation must be submitted for approval (example chemical blasting). In any event the Employer's Agent will require the Contractor to plan and execute each blast in such a manner as to ensure that no damage will be caused to any structure, pipeline or service. In addition, the Employer's Agent will require vibro-recordings to be taken at no additional cost to the Employer. No blasting is to be carried out in Eskom servitudes or wayleaves unless the Eskom authorities have been advised in writing three weeks prior to blasting. Where blasting is done adjacent to Eskom power lines, the Contractor shall arrange for a representative of Eskom to be present prior to and during any blast.

The Contractor shall submit his blasting plan for approval to the Employer's Agent at least 14 days prior to the blasting operation

### **PS 10.3 Environmental Aspects**

The Contractor will be required to plan and undertake his work in a manner that minimises its impact on the natural environment. Trees and other vegetation shall, wherever possible, be left undisturbed. Trees that are marked by the Employer's Agent shall not be damaged and in the event of the Contractor doing so, a penalty will be deducted from monies due to the Contractor.

Every effort shall be made by the Contractor to prevent pollution of the adjacent areas and river and to reduce the noise, dust and fumes emanating from his construction activities.

### **PS 10.4 Dealing with Water**

Where necessary, the Contractor shall construct temporary drainage channels to divert ground water from his excavation and excess water must be pumped out.

No compensation for any variation of the actual conditions during construction from the data given will be considered. Neither will additional compensation be considered for data omitted or inaccurately given.

The rates tendered shall allow for the requirements of this clause and all incidentals.

The Contractor shall include with his tender a preliminary programme on the prescribed form 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.

In drawing up his programme, the tenderer is to take into account the following:

- i) Permissible period of downtime while creating the river diversions for construction of the dam wall.
- ii) The river should flow continuously without determined risk of overtopping the river diversion system.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Project Specifications and in the Contract Data (**Refer to PS-13**).

#### **PS 10.5 Servitudes and Rights of Way**

The Employer will, where necessary, obtain permanent servitudes and rights of way along the road routes indicated on the tender drawings. New servitudes will only be registered after completion of the Works.

#### **PS 10.6 Dealing with Damaged Services**

In the event of any service being damaged or accidentally disconnected for any reason, the Contractor shall immediately contact the relevant authority for instruction and shall report the occurrence of the incident. The damage is to be repaired as soon as possible to the approval of the Employer's Agent and the authority. The Contractor will be held responsible for paying all costs incurred by the authority or himself as a result of each such incident, where relevant.

#### **PS 10.7 Accommodation of Traffic**

The Contractor shall always ensure the safe and expeditious passage of traffic and shall provide all necessary temporary road traffic signs, barricades, flagmen, etc. to safeguard the travelling public. Any detours or bypasses constructed by the Contractor shall be adequately signposted, as per the South African Road Traffic Signs Manual, and maintained in such a manner as to provide safe and easy passage of traffic.

Contractor shall submit his "Accommodation of Traffic Plan" within 14 days from the Commencement Date.

#### **PS 10.8 Spoil Material**

No indiscriminate spoiling of material will be allowed. All surplus or unsuitable material shall be spoiled, levelled and spread in designated areas as directed by the Employer's Agent. All haul will be regarded as freehaul.

#### **PS 10.9 Finishing and Tidying and Defects Liability Period**

On no account must rubble and spoil materials, other materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of other Contractors or Authorities.

Finishing and tidying must not simply be left until the end of the construction period. The Contractor will be entitled in terms of sub-clause 5.14.7, subject to prior agreement with the Employer's Agent and within reasonable limits, to request that work in a particular area and/or work of a particular discipline, be inspected for partial completion. The specified defects liability period in respect of any specific section of the Works shall commence on the date on which the relevant section is accepted by the Employer's Agent as being completed, i.e. fully commissioned, including finishing and tidying.

On completion of the Contract the Contractor shall ensure that all materials used in the construction of the temporary Site office, workshop and storage yard are removed from Site. Waste materials such as construction debris and soil contaminated with oil and fuel are to be disposed of at the solid waste disposal site used approved by the Employer's Agent. Prior to the handover of the Site to the Employer, the Contractor and the Employer's Agent will conduct a post construction audit to determine if any additional measures that are to be taken. The Completion Certificate will only be issued after this stage.

**PS 10.10 Employee Accommodation**

(See Subclause 3.2.1 of Section A of Part 2 and Subclause 1.2.1 of Section A of Part 3 of SABS 0120)

The Contractor shall conform in all respects with the provisions of any Act, Regulations or By-Law of Harry Gwala District Municipality, which may be applicable to employee accommodation. Save for a security guard on active duty, no employees may be housed on Site or the Contractor's campsite after normal working hours.

**PS 10.11 Employment of Local Labour**

The Employer has determined that 100% of the Contractor's unskilled labour force shall be made up from the local community. A labour sub-committee (of a Project Steering Committee) comprising representatives of the community and other stakeholders will be responsible for the recruitment of all local labour. The Contractor will be required to provide details of the numbers of semi-skilled and unskilled workers he will require, together with their anticipated starting dates. The PSC through its labour sub-committee will then make this labour available to the Contractor.

A minimum of 50% of the local labour shall comprise of women and, where appropriate, disabled labour shall be employed. It is a requirement that tenderers acquaint themselves fully with requirements for registration with Unemployment Insurance Fund.

The Employer requires that the successful contractor registers all labour with the Unemployment Insurance Fund. The local labour rate has been determined at R200.00/day per labourer. The task for excavation by hand has been agreed at 2,4 m<sup>3</sup>/day (e.g. 0,76 m x 1,0 m x 3,15 m).

During project execution, the successful contractor will be required to provide progress reports indicating to what level these requirements have been met.

**PS 10.12 Expanded Public Works Programme Construction Methods**

EPWP construction methods will be utilised on this contract in order to generate employment opportunities for the local community.

**PS 10.13 Frequency of Labour Wages Payments**

The contractor will be required to pay labour on a fortnightly basis.

**PS 10.14 Training and Capacity Building**

During project execution, it is the desire of the Employer that an identified number of community members receive appropriate level of non-accredited training in either concrete casting activities or construction management activities. Within 14 days of appointment, the successful contractor will be required to provide, together with his method statement, a proposal for consideration by the Project Steering Committee for activities in which the community members can receive training. This proposal will be considered by the Project Steering Committee after which the Contractor will be given an instruction on the training to provide. Training will be provided to local labour that is already in the employ of the contractors as per clause PS 10.11. It must be noted that the Contractor will be required to pay the labour based on their daily rates indicated in PS 10.11.

Should the contractor fail to provide this training, the Employer reserves the right to seek training from alternative sources. In that case, the cost of the training sought will be deductible from any monies due to the contractor.

**PS 10.15 Contractor Participation Goal (CPG) Partner**

The Employer will require that the contractor utilise a CPG partner on the contract as part of development of emerging contractors. The CPG partner will be approved by the Employer and will be required to undertake up to 30% of the scope of work. Should the contractor be unable to provide a CPG partner, the Employer will provide one on the contract. Tenderers are also referred to Contract Data, Clause 4.4.7 in this regard.

**PS-11 REQUIREMENTS FOR ACCOMMODATION OF TRAFFIC**

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**PS-11.1 General**

The Contractor will be responsible for the safe and easy passage of public traffic past and on sections of roads of which he has occupation or where work has to be done near traffic.

Accommodation of traffic, where applicable shall comply with SANS 1921-2: 2004: Construction and Management Requirements for Works Contracts, Part 2: Accommodation of Traffic on Public Roads occupied by the Contractor. The Contractor shall obtain this specification from Standards South Africa if accommodation of traffic will be involved on any part of the construction works.

**PS-11.2 Basic Requirements**

The travelling public shall have the right of way on public roads, and the Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

The Contractor shall ensure that all road signs, barricades, delineators, flagmen and speed controls are effective, and that courtesy is always extended to the public.

Failure to maintain road signs, warning signs or flicker lights, etc, in a good condition shall constitute ample reason for the Employer's Agent to suspend the work until the road signs, etc, have been repaired to his satisfaction.

The Contractor may not commence constructional activities affecting existing roads before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual.

The Contractor shall construct and maintain all temporary drainage works necessary for temporary deviations.

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area in which he is working.

**PS-11.3 Traffic Safety Officer**

Where warranted by traffic conditions on or near the site, the Contractor shall nominate a suitable member of his staff as traffic safety officer to be responsible for the arrangement and maintenance of all the measures for the accommodation of traffic for the duration of the project. Duties of the traffic safety officer shall be as set out in SANS 1921 Part 2 and shall also comply with the Occupational Health and Safety Act No 85 of 1993 and the Construction Regulations 2014.

**PS-11.4 Payment**

The Contractor's tendered rates for the relevant items in the Bill of Quantities shall include full compensation for all possible additional costs which may arise from this, and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered.

Items that may be considered for payment are specified in SABS 1200 Standardized Specifications and the related project specification.

## **PS-12 OCCUPATIONAL HEALTH AND SAFETY (Read with SANS 1921 - 1: 2004 clause 4.14)**

### **PS-12.1 General statement**

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to 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 and Amendment Act No 181 of 1993, and the OHS Act 1993 Construction Regulations 2014 issued by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatar and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act by executing the Agreement form C1.5 included in Section C1: Agreements and Contract Data.

### **PS-12.2 Health and Safety Specifications and Plans to be submitted at tender stage**

#### **(a) Employer's Health and Safety Specification**

The Employer's Health and Safety Specification will be included in the tender documents as part of the Project Specifications.

#### **(b) Tenderer's Health and Safety Plan**

The successful Tenderer shall, on receipt of notification that he has been awarded the contract, submit without delay his own documented 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;
- (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.
- (viii) Covid-19 Regulations to be included

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.

During the construction a penalty of R5000/day will be levied for not complying to the H7S specifications until the finding is corrected.

**PS-12.3 Cost of compliance with the OHS Act 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 the Employer's Health and Safety Specification 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 in the Construction Regulations and in the Employer's Health and Safety Specification.

Items that may qualify for remuneration will be specified in the Safety Specifications included or in the Project specifications.

**PS-13 ADVERSE WEATHER CONDITIONS**

In terms of Clause 5.12.2 of the General Conditions of Contract, extension of time will be considered for **abnormal rainfall**. The numbers of days per month on which work is expected not to be possible as a result of **normal rainfall**, and for which the Contractor shall make provision in his tendered rates, prices and programme, are listed in Table PS-13. Only the number of days lost as a result of adverse weather conditions, exceeding the number of days listed in **Table PS-13.1**, will qualify for consideration of extension of time.

During the execution of the Works, the Employer's Agent's Representative will certify a day lost due to abnormal rainfall and adverse weather conditions only:

- 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 Employer's Agent's Representative as lost due to rainfall and adverse weather conditions, less the number of days allowed for as in **Table PS-13**, 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."

Table PS-13: Expected N° of Working Days Lost Monthly Due to Normal Rainfall per year

MONTH	Expected number of working days lost as result of normal rainfall
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>

*(Based on information obtained from the Weather Bureau, Department of Environment Affairs, Kostad The average monthly rainfall figures quoted, are included for information only, and shall not be taken into consideration for calculation of extension of time. The number of working days lost for December and January allows for the builders' holidays from 19 December 2022 and ending on 10 January 2023 subsequently from 18 December 2023 and 09 January 2024.)*

**PS-14 SITE MEETINGS AND REPORTING**

The Contractor will be required to attend site meetings organised by the Employer's Agent. In these meetings he (the Contractor) will be required to provide progress reports and other reports to monitor the outputs of the contractor, as may be required from time to time, to be presented in a format prescribed by the Employer's Agent. The frequency of such meetings will be weekly, as a minimum. However, the frequency can be reviewed, depending on the progress of the contract.

**PS-15 PREFERENTIAL PROCUREMENT**

For the purpose of this contract the Contractor shall comply with the preferential procurement statement provided in F.3.11 and T2.2 of the Tender Data.

**PS-16 EPWP SPECIFICATION**

**PS-16.1 Labour Intensive Competencies of Supervisory and Management Staff**

Contractors shall only engage supervisory and management staff in labour intensive works that have completed the skills programme outlined in **Table PS-16.1** :

**Table PS-16.1: Skills programme for supervisory and management staff**

Personnel	NQF level	Unit standard titles	Skills programme description
Foreman / Supervisor	4	Implement Labour-Intensive Construction Systems and Techniques.	This unit standard must be completed, <b>and</b>  any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	
		Use Labour-Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain Structures	
Site Agent / Manager (i.e. the contractor's most senior representative that is resident on the site)	5	Manage Labour-Intensive Construction Processes	Skills Programme against this single unit standard

## **PS-16.2 Employment of Unskilled and Semi-Skilled Workers in Labour-Intensive Works**

### **PS-16.2.1 Requirements for the sourcing and engagement of labour.**

PS-16.2.1.1 **The overall youth target is 55%; women 60% and people with disabilities is 2%.**

EPWP Reporting procedure: Employment contracts, ID Copies, Payment register, Attendance registers must be attached on every claim that is submitted by the contractor. Contractor must ensure that this information is submitted every month for reporting and compliance purposes. The contractor's invoices shall not be paid until all pending labour information has been submitted.

Unskilled and semi-skilled labour required for the execution of all labour intensive works shall be engaged strictly in accordance with prevailing legislation in accordance with the Code of Good Practice for the Expanded Public Works Programme.

PS-16.2.1.2 The following are some of the considerations that are elaborated in the Code of Good Practice for Expanded Public Works Programmes.

### **PS-16.2.2 Training of Targeted Labour**

PS-16.2.2.1 The contractor shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.

PS-16.2.2.2 Accredited training may be provided before the commencement of a project.

PS-16.2.2.3 The cost of accredited training of targeted labour will be funded through various funding sources such as National Skills Fund from the Department of Higher Education and Training, funds from the Implementing Public body, funding from SETAS etc. This training should take place as close to the project site as practically possible. The Public Body implementing the project must ensure that training applications for beneficiaries are made by its relevant project manager assisted by relevant training officials from the National Department of Public Works.

PS-16.2.2.4 The Public Body must ensure that preference of the training of beneficiaries in technical skills over life skills is made. In addition, the Public Body is required to maximize opportunities for training to beneficiaries to be carried out before the implementation of projects.

PS-16.2.2.5 The Public body must ensure that workers who have received training will be placed on the project to work after receiving the training.

PS-16.2.2.6 If a provisional sum for training is made in the contract the contractor shall pay an allowance equal to 100% of the daily wage rate to workers who attend accredited training.

### **PS-16.3 Generic Labour-Intensive Specification**

The Generic Labour-intensive specification below (informed by SANS 1921-5, Construction and management requirements for works contracts - Part 5: Earthworks) covers activities which are to be performed by hand and should be included in the scope of works without amendment or modification as set out below.

This specification establishes general requirements for activities which are to be executed by hand involving the following:

- low-volume roads (typically less than 500 vehicles per day);
- sidewalks and non-motorised transport infrastructure
- water and sanitation
- concrete curing

#### **PS-16.3.1 Precedence**

Where this specification is in conflict with any other standard or specification referred to in the Scope of Works to this Contract, the requirements of this specification shall prevail.

#### **PS-16.3.2 Hand excavatable material**

Hand excavatable material is:

##### **a) granular materials:**

- a) whose consistency when profiled may in terms of **Table PS-16.3.2** be classified as very loose, loose, medium dense, or dense; or
- b) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 15 blows of a dynamic cone penetrometer is required to penetrate 100mm;

##### **b) cohesive materials:**

- i) whose consistency when profiled may in terms of **Table PS-16.3.2** be classified as very soft, soft, firm, stiff and stiff / very stiff; or
- ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100mm;

##### **Note**

1. A boulder is material with a particle size greater than 200mm, a cobble and gravel is material between 60 and 200mm.
2. A dynamic cone penetrometer is an instrument used to measure the in-situ shear resistance of a soil comprising a drop weight of approximately 10 kg which falls through a height of 400mm and drives a cone having a maximum diameter of 20mm (cone angle of 60° with respect to the horizontal) into the material being used.

<b>Table PS-16.3.2: Consistency of materials when profiled</b>			
<b>GRANULAR MATERIALS</b>		<b>COHESIVE MATERIALS</b>	
<b>CONSISTENCY</b>	<b>DESCRIPTION</b>	<b>CONSISTENCY</b>	<b>DESCRIPTION</b>
Very loose	Crumbles very easily when scraped with a geological pick.	Very soft	Geological pick head can easily be pushed in as far as the shaft of the handle.
Loose	Small resistance to penetration by sharp end of a geological pick.	Soft	Easily dented by thumb; sharp end of a geological pick can be pushed in 30-40 mm; can be moulded by fingers with some pressure.
Medium dense	Considerable resistance to penetration by sharp end of a geological pick.	Firm	Indented by thumb with effort; sharp end of geological pick can be pushed in upto 10 mm; very difficult to mould with fingers; can just be penetrated with an ordinary hand spade.
Dense	Very high resistance to penetration by the sharp end of a geological pick; requires many blows for excavation.	Stiff	Can be indented by thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail with difficulty; slight indentation produced by blow of a geological pick point.

**PS-16.3.3 Trench excavation**

No trenches will be required to be dug under this contract.

**PS-16.3.4 Compaction of backfilling to trenches (areas not subject to traffic)**

No trenches will be required to be dug under this contract.

**PS-16.3.5 Excavation**

All hand excavatable material including topsoil classified as hand excavatable shall be excavated by hand. Harder material may be loosened by mechanical means prior to excavation by hand.

The excavation of any material which presents the possibility of danger or injury to workers shall not be excavated by hand.

**PS-16.3.6 Clearing and grubbing**

Grass and small bushes shall be cleared by hand.

**PS-16.3.7 Shaping**

All shaping shall be undertaken by hand.

**PS-16.3.8 Loading**

All loading shall be done by hand. Haulage equipment should be selected in a manner that allows loading by hand to the extent possible.

**PS-16.3.9 Haul**

Excavation material shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

**PS-16.3.10 Offloading**

All material, however transported, is to be off-loaded by hand, unless tipper-trucks are utilised for haulage.

**PS-16.3.11 Spreading**

All material shall be spread by hand.

**PS-16.3.12 Compaction**

Small areas may be compacted by hand provided that the specified compaction is achieved. Appropriate rollers should be used where higher (than can be achieved by hand) levels of compaction are required.

**PS-16.3.13 Grassing**

All grassing shall be undertaken by sprigging, sodding, or seeding by hand.

**PS-16.3.14 Stone pitching and rubble concrete masonry**

All stone required for stone pitching and rubble concrete masonry, whether grouted or dry, must be collected, loaded, off loaded and placed by hand.

Sand and stone shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150m.

Grout shall be mixed and placed by hand.

**PS-16.3.15 Manufactured Elements**

Elements manufactured or supplied by the Contractor, such as pipes, masonry units and edge beams shall not individually, have a mass of more than 320kg. In addition, the items shall be large enough so that four workers can conveniently and simultaneously acquire a proper hand hold on them.

**PS 17 SUBCONTRACTING OF A PORTION OF THE CONTRACT**

The successful Tenderer will be required to employ local and disabled people and moreover, subcontract up to a maximum of 30% of the project value to local contractors. The "local contractors" will be located in the Harry District Municipality area of jurisdiction and where specifically required by the Employer, the area where construction works are being undertaken.

Also refer to Contract Data.

## PROJECT SPECIFICATION: PORTION 2

### AMENDMENTS TO THE STANDARD AND PARTICULAR SPECIFICATIONS

#### INTRODUCTION

In certain clauses the standard, standardized and particular specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternative or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains additional specifications required for this particular contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix PS followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications. The number of a new clause or payment item, which does not form part of a clause or a payment item in the standard specifications and which is included here, is also prefixed by PS, but followed by a new number which follows on the last clause or item number used in the relevant section of the standard specifications.

PROJECT SPECIFICATION: PORTION 2

**SANS 1200 PSA : GENERAL**

**PS A 2 INTERPRETATIONS**

**PS A 2.3 DEFINITIONS**

Add the following to A 2.3:

Employer's Agent's Office. An office constructed on the Site, or a prefabricated mobile or semi-mobile office unit for the Employer's Agent.

Communication costs (cellular phone). Samsung S22 smart phone or similar that shall be provided by the contractor as part of Employer's Agent's facilities.

Electronic equipment. This item covers a laptop, I7 Dell laptop or similar, Canon I-SENSYS MF237w A4 Multifunction Mono Laser Business Printer 1418C153 or similar, Huawei mobile router with 4G connection data sim card and 20GB monthly data, which shall be provided by the contractor as part of the Employer's Agent's facilities.

Survey equipment. STABILA OLS 26 optical level, 8-piece set (dumpy level and staff) or similar which shall be provided by the contractor as part of the Employer's Agent's facilities.

**PS A 3 MATERIALS**

All the Contractor's suppliers are to be approved and inspected by the Employer's Agent before they are engaged.

**PS A 3.1 QUALITY**

Where there is a standardised mark programme for any material, all such material supplied shall bear the official standardisation mark. The Employer's Agent's approval is based on tests conducted by the Contractor as required by this Contract.

All materials proposed by the Contractor for incorporation into the work shall where required, be tested in accordance with the Specification. The Contractor is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of control tests done by the Employer's Agent and for which the result do not comply with the minimum requirements shall be for the Contractor's account.

All test results shall be submitted to the Employer's Agent for approval prior to such materials being built into the works. No material shall be built into the works without such approval. All costs involved in this testing shall be deemed to be included in the rates tendered.

The Contractor shall inform the Employer's Agent of any control testing to be done at least 48 hours before such tests are required and must allow in his program for the time necessary for the tests and the processing of the results thereof.

The handling, storage, transport and erection of equipment, machinery and materials shall be strictly in accordance with the requirements of the supplier and/or manufacturer.

All materials shall be new and of the best quality available unless otherwise specified. They must function satisfactorily under the prevailing climate and weather conditions at the place of installations.

The Contractor is totally responsible for the implementation of an approved QA system equivalent to ISO 9000. The system shall be submitted to the Employer's Agent for approval within 14 days of the start of the

Contract and shall define methods to ensure that all necessary quality standards are attained. The Employer's Agent will audit the applications of the QA system on a regular basis during this Contract.

#### **PS A 4 PLANT**

All plant provided by the Contractor for the execution and maintenance of the works shall be of a character comparable with the scope of the works.

The Contractor shall provide and maintain sufficient plant to meet all contractual requirements and shall not remove any of this plant from the site without the written permission of the Employer's Agent. He shall, however, remove unsuitable, obsolete or worn-out plant from the site when ordered to do so by the Employer's Agent and replace these with plant approved by the Employer's Agent.

The approval of any plant on the site by the Employer's Agent shall in no way relieve the Contractor of any of his obligations under the Contract.

#### **PS A 4.2 Contractor's Offices, Stores and Resources**

Add the following to A 4.2:

No housing is available for the Contractor's employees and the contractor must make his own arrangements for accommodation and transport of his employees.

#### **PS A 4.3 Hand Tools**

The contractor shall provide and maintain all hand tools required for the execution of the Works.

#### **PS A 5 CONSTRUCTION**

On completion of the scope of work associated with each construction drawing, the Contractor shall provide a marked-up "as-built" copy of the drawing. These drawings shall incorporate all changes, amendments and additions that have occurred and the drawings shall be signed by the Contractor's representative and submitted to the Employer's Agent for incorporation into the final As-Built drawings and signature and acceptance.

Where surveying is necessary to determine as-built conditions, the Contractor shall provide a land surveyor on Site to undertake the as-built survey within 24 hours of being so instructed by the Employer's Agent.

#### **PS A 5.1. Survey**

##### **PS A 5.1.1 Setting out of the Works**

Substitute the first sentence in A 5.1.1 with the following:

Setting out of the work is the sole responsibility of the Contractor and shall be done from the layouts given to him. Any discrepancy shall immediately be reported in writing to the Employer's Agent. Any costs or subsequent costs arising from discrepancies, which had not been reported to the Employer's Agent, shall be the sole responsibility of the Contractor. The exact position of dam and associated apertures shall be determined on site in conjunction with the Employer's Agent and must be approved before construction of the specific section starts.

The Employer's Agent may alter any part of the works to suit the local conditions. The Contractor must therefore contact the Employer's Agent immediately after the preliminary setting out of any part of the works before starting with detail setting out, or construction. Only after the Employer's Agent has approved a specific site or part of works, may the detail setting out and construction commence.

#### **PS A 5.2 Watching, Barricading, Lighting And Traffic Crossings**



Add the following to A 5.2.

The crossing of existing tar and dirt roads must be done in half widths, while the total traffic is accommodated on the other lane.

Road traffic signs shall comply with the requirements of the "South African Road Traffic Signs Manual" and shall be approved by the Employer's Agent before construction commences.

**PS A 5.9 Transporting of Materials**

Where the transporting of materials outside of the site is such as to generate a nuisance, the material shall be covered during transport.

Precautions shall be taken during the transporting of muddy and other materials to prevent its fouling completed construction or roads. Any rock or debris falling from trucks on to roads shall be removed immediately.

Access Roads to Site - The Contractor shall keep in good and constant repair all access roads to and on the site.

Any route that the Contractor wishes to use to the place where water is obtained or any other route that is used by the Contractor shall be subject to approval by the Employer's Agent. All the Contractor's vehicles on the Site must be in a roadworthy condition. The number of the Contractor's vehicles on the Site will be subject to approval by the Employer's Agent.

**PS A 7 TESTING**

**PS A 7.2 Approved Laboratories**

The Contractor may appoint an SANAS accredited independent testing laboratory to the approval of the Employer's Agent. The Employer's Agent shall be given free access to any appointed laboratory.

**PS A 7.4 Statistical Analysis of Control Tests**

Substitute A 7.4 with the following:

Test results shall not be evaluated by statistical methods. All results shall comply with the specified minimum requirements of the materials concerned. However, the contractor should provide, as part of his Quality Control Plan, a method to identify early warning signs in terms of strengths (example, CUSUM method).

**PS A 8 MEASUREMENT AND PAYMENT**

**PS A 8.1.2.3 The Contractor to Price all Items**

In addition, the Contractor shall provide a detailed schedule itemising the breakdown of each item listed in the Preliminary and General section of the Schedule of Quantities, in terms of all personnel, plant, structures, facilities etc. not covered by the construction rates elsewhere in the schedule. The rate for each item in the detailed schedule shall cover all direct and overhead costs, profit and all other costs for provision of the item.

**PS A 8.3 FIXED CHARGE AND VALUE-RELATED ITEMS**

**PS 8.3.1 Contractual Requirements ..... Unit: Sum**

The sum shall cover the Contractor's initial costs of providing sureties, insurance of the works and plant, third party or public liability insurance and unemployment insurance to cover his compliance with the requirements of the Workmen's Compensation Act, 1941 (Act No. 30 of 1941) and any other initial financing obligations of a preliminary and general nature, such contributions of the CEITB.

The tendered amounts for fixed charge and value related items will not be increased, if extension of time for the completion of the works is awarded.

**PS A 8.3.2 Establishment of Facilities on the Site**

**PS A 8.3.2.1 Facilities for Employer's Agent**

- a) Employer's Agent's office (3 No) ..... Unit: Sum

The Contractor shall provide, furnish and equip 3 offices (as scheduled) for the use of the Employer's Agent.

Each office shall be weatherproof, shall have a wooden boarded floor that is at least 150 mm above the ground, and shall be provided with a ceiling and a lining to the walls, or equivalent insulation, with an acceptable type of door with a secure lock, and two opening windows of glazed. Each office shall be well ventilated and shall be so insulated as to provide comfortable working conditions.

Office building shall be painted with an approved paint after erection and the paintwork shall be maintained during the contract period.

Each door shall be provided with a lock and two keys.

The sitting of all offices shall be to the Employer's Agent's satisfaction and shall be decided upon in consultation with him/her and confirmed in writing before erection.

The offices shall comply with the following requirements.

<u>Dimensions</u>	<u>Type 1 Office</u>
Minimum floor area	30 m <sup>2</sup>
Minimum window area	4.0 m <sup>2</sup>
Minimum window area opening	2.4 m <sup>2</sup>
Minimum clear height	2.5 m
Shaded parking for vehicles	3

Furniture and Equipment

Each office shall be equipped with the following:

- (i) Office desk with a surface area of at least 1.5m<sup>2</sup> with at least 3 drawers one of which can be locked.
- (ii) Two office chairs.
- (iii) One high back office chair.
- (iv) a lockable upright steel cabinet with three shelves or a steel filing cabinet with four drawers
- (v) Refrigerator (maximum 150 litres).
- (vi) Microwave oven (maximum 30 litres).
- (vii) Sufficient racks and hangers for hanging contract drawings. The hangers shall be of the "Barhold" type, with one hanger to five drawings.

(viii) Double 80-watt fluorescent light fittings complete with ballast and tubes (2 per Type 1 office).

In addition to the above the Type 1 office shall be equipped with the following:

- (i) Conference table large enough to accommodate twelve people and have an area of at least 15m<sup>2</sup>.
- (ii) Fifteen office chairs.
- (iii) The Contractor shall also supply a toilet for the exclusive use of the Employer's Agent.
- (iv) The Contractor must provide basic survey instruments: dumpy level, tripod stand and staff.
- (v) On completion of the Works, ownership of the buildings, furnishings and equipment shall revert to the Contractor who shall remove them from the Site.

b) Communications costs (cellular phone) ..... Unit: Sum

The Contractor shall provide a cellular phone for the use of the Employer's Agent for official purposes.

- i) Smart phone with 6GB RAM, 128GB storage, 5.000mAh battery, 20MP Ultra-Wide Camera.

c) Nameboards (2 No) ..... Unit: Sum

Two (2) nameboards will be ordered by the Contractor according to the Employer's Agent's specifications, complete with dimensions, wording and specifications as prescribed in a Drawing, within one month from the commencement date. The Contractor shall be responsible to transport the name board to site and to erect it at the indicated position on suitable supporting posts. The Contractor shall remove the name board completely from site after construction is completed, before the last payment certificate shall be approved.

d) Electronic equipment ..... Unit: Sum

The Contractor shall provide the following electronic equipment for the use of the Employer's Agent for official purposes.

- i) Intel(R) Core(TM) i7-10510U CPU @ 1.80GHz 2.30 GHz Processor with 24GB RAM laptop
- ii) A4 Multifunction Mono Laser Business Printer
- iii) Mobile router with 4G connection data sim card
- iv) 20GB of data for 4G connection data sim card

e) Provision of survey equipment ..... Unit: Sum

The Contractor shall provide the following survey equipment for the use of the Employer's Agent.

- i) OLS 26 optical level
- ii) 8-piece set (dumpy level staff)

**PS A 8.3.2.2 Facilities for Contractor**

a) Offices and storage sheds ..... Unit: Sum

b) Workshops ..... Unit: Sum

c) Laboratories ..... Unit: Sum

d) Living accommodation .....	Unit:
Sum	
e) Ablution and latrine facilities .....	Unit:
Sum	
f) Tools and equipment .....	Unit:
Sum	
g) Water supplies, electric power and communications .....	Unit: Sum
h) Dealing with water (Clause 5.5) .....	Unit: Sum
i) Access (Clause 5.8) .....	Unit: Sum
j) Plant .....	Unit:
Sum	

**PS A 8.3.3. Other Fixed Charge Obligations**

**PS A 8.3.3.1 Issuing of notices to consumers ..... Unit: Sum**

The sum shall cover the full compensation and cost of supply and delivery of the notices and warnings to customers at least 3 days before a shutdown is to take place in each section of work.

**PS A 8.3.3.2 OHS Act Obligations:**

The sum shall cover the full compensation and fixed costs for the compliance with the Occupational Health and Safety Act (85 of 1993), Construction Regulations 2017 and all the requirements stipulated in the Employer’s Health and Safety Specifications.”

i) <b>General Safety obligations (incl. provision of personal protective equipment)</b> .....	Unit:
<b>Sum</b>	
ii) <b>Health and Safety plan/file including health and safety training</b> .....	Unit: Sum
iii) <b>Safety Office</b> .....	Unit:
<b>Sum</b>	
iv) <b>Covid 19-Regulations</b>	

**PS A 8.3.4 Removal of Site Establishment**

The sum shall cover the cost of the demolition on and the removal from the surface of the site of all items established in terms of 8.3.2 and 8.3.3, and shall provide for the making good and the restoring of the site to the satisfaction of the Employer’s Agent.

**PS A 8.3.5 Occupational Health and Safety**

**PS A 8.3.5.1 Contractor's initial obligations in respect of the Occupation Health and Safety Act and Contractual Regulations.....Unit: Sum**

The amount will be paid on the scheduled rate on condition that:

- The contractor has notified the Provincial Director of the Department of Labour in writing of the project.
- The client has approved the contractor’s Health and Safety Plan.
- The contractor has set up his Health and Safety File and Safety Plan.
- The contractor has appointed a Health and Safety Officer.

The provisional sum shall represent full compensation for that part of the contractor’s general obligations in terms of Occupational Health and Safety Act and the Construction Regulation which are mainly a function of time. The sum for the supply of all safety clothing, first aid kit, etc. in order to adhere to the occupational Health and Safety Act specifications. The Contractor must familiarize himself with the conditions as per

Occupational Health and Safety Act and adhere thereto. The rate shall cover the Contractor's overheads, changes, and profit payments for the service Provider. Contractor to note that this item covers the costs for the preparation and submission of Health and Safety plan and file.

Payment shall be as specified for item 1.3 in the standard specifications.

**PS A 8.3.5.2 Occupational Health and Safety Act ..... Unit: Sum**

Handling cost in respect of sub-item 8.3.5. A percentage of the payment made to the Occupational Health and Safety Act will be paid to the contractor under this section. The rate shall cover the Contractor's overheads, changes, and profit on payments for the Occupational Health and Safety Act.

- **Provision of Safety Officer**

The Contractor should appoint the safety officer who will be fulltime responsible for all safety issues on site, and he or she should be fulltime on site.

The tendered rates include the full compensation for that part of the provision of safety officer in terms of the Occupational Health and Safety Act and the Construction Regulation which are mainly a function of time. Payment shall be made monthly.

- Handling cost in respect of sub-item 8.3.5.2 (a). A per percentage of the payment made to the Safety Officer will be paid to the Contractor. The rate shall cover the Contractor's overheads, changes and profit on payments for the Safety Officer.

**PS A 8.3.5.3 Contractor's time related obligation in respect of the OH & S Act and Construction Regulation**

The tendered lump sum shall represent full compensation for that part of the contractor's general obligations in terms of Occupational Health and Safety Act and the Construction Regulations which are mainly a function of time. The lump sum will be paid monthly only after payment for item 1.3.3 and item 1.1.5 has been made. Payment of the lumpsum shall be made monthly (calculated by the division of the lumpsum by the number of months remaining).

**PS A 8.3.5.4 Environmental Management Plan Obligations ..... Unit : Sum**

The sum shall cover the full compensation and all fixed costs for compliance with the requirements of the Employer's Environmental Management Plan including compliances with Record of Decision issued by GDARD.

**PS A 8.2.2 Time-Related Items**

The tendered amount for a time-related item will be increased; if any extension of time for the completion of the works is awarded on the condition that the activity related to the item tendered for must be sustained during the extended period.

The ratio between the increased amount for a time-related item and the tendered amount must be the same as the ratio between the extension of the time period for the completion of the works and the original time period allowed for completion of the works.

If the works is completed before the end of the original time period allowed for completion of the works, the tendered amount of time related item that is influenced by the earlier completion would be reduced similarly.

**PS A 8.4 SCHEDULED TIME RELATED ITEMS**

**PS A 8.4.2.1 Facilities for Employer's Agent**

- a) Employer’s Agent’s office as previously described..... Unit: Sum

**PS A 8.4.2.2 Facilities for Contractor**

- a) Offices and storage sheds ..... Unit: Sum  
Sum
- b) Workshops ..... Unit: Sum  
Sum
- c) Laboratories ..... Unit: Sum  
Sum
- d) Living accommodation ..... Unit: Sum  
Sum
- e) Ablution and latrine facilities ..... Unit: Sum  
Sum
- f) Tools and equipment ..... Unit: Sum
- g) Water supplies, electric power and communications ..... Unit: Sum
- h) Dealing with water (Clause 5.5) ..... Unit: Sum
- i) Access (Clause 5.8) ..... Unit: Sum
- j) Plant ..... Unit: Sum

The sum shall cover the Contractor’s initial costs of providing sureties, insurance of the works and plant, third party or public liability insurance and unemployment insurance to cover his compliance with the requirements of the Workmen’s Compensation Act, 1941 (Act No. 30 of 1941) and any other initial financing obligations of a general and preliminary nature, such contributions to the CEITB. Establishment of Facilities on the Site Facilities for Employer’s Agent.

**PS A 8.4.3 Supervision for Duration of Construction**

The sum shall cover the costs of on-site supervision and such local administration as the Contractor considers necessary for the proper completion of the Works, and shall cover the cost of the salaries, wages and allowances paid to the site agent, general foreman, section foreman (where applicable), site surveyors, timekeepers, assistants and other site supervisory staff, and of transport incurred in connection with such staff. Plant (designated plant or plant for designated operations or plant for use during Supervision for Duration of Construction)

**PS A 8.4.6.1 OHS Act Obligations:**

The sum shall cover the full compensation and fixed costs for the compliance with the Occupational Health and Safety Act (85 of 1993), Construction Regulations 2017 and all the requirements stipulated in the Employer’s Health and Safety Specifications.”

- i) **General Safety obligations (incl. provision of personal protective equipment)** ..... Unit: Sum  
Sum
- ii) **Health and Safety plan/file including health and safety training** ..... Unit: Sum
- iii) **Safety Office** ..... Unit: Sum  
Sum

**PS A 8.4.6.2 Security Services ..... Unit: Sum**

**PS A 8.4.6.4 Environmental Management Plan Obligations ..... Unit : Sum**

The sum shall cover the full compensation and all fixed costs for compliance with the requirements of the Employer’s Environmental Management Plan including compliances with Record of Decision issued by KZN Department of Environment, Forestry and Fisheries.

**PS A 8.5 Sums Stated Provisionally By Employer’s Agent**

**a) For work to be done by Contractor and values in terms of Clause 8.1.2.1 (d) of conditions contract**

**i) Community Liaison Office ..... Unit:  
Sum**

The Contractor must pay a salary to a person appointed as the Community Liaison Officer for the project for the duration of the contract. The amount of payment and payment dates will be determined as soon as the Community Liaison Officer is appointed.

**ii) PSC Meetings Attendance ..... Unit:  
Sum**

The tendered rate shall cover the compensation of all members of Project Steering Committee for attending meetings. The amount of payment and payment dates will be determined on the commencement date of the project. The Employer’s Agent should authorize payment before it is made. Proof of payment has to be submitted to the Employer’s Agent before claim can be certified.

**iii) Overheads, Charges and Profit on (1) above ..... 1%**

Handling costs and profit in respect of sub-item 8.5 (a) 1 & 1. A percentage made to the Community Liaison Officer and PSC Meeting attendance will be paid to the contractor. The rate shall cover the Contractor’s overheads, charges and profit on payments for the Community Liaison Officer and PSC members.

**b) For work to be done by a nominated sub-contractor (or Employer)**

**i) Control tests**

Provisional sum for control tests by independent laboratory. Additional tests that may be required by the Employer’s Agent over and above normal quality control tests performed by the Contractor. The name and contact details of the Training Company, to be appointed by the Contractor, will be supplied to the Contractor by the Employer or Employer’s Agent.

**ii) Overheads, charges and profit on (i) above**

Handling costs and profit in respect of sub-item 8.5 (b) i. A percentage of the payment to the Independent Laboratory will be paid to the Contractor. The rate shall cover the Contractor’s overheads, changes, and profit on payments for the Independent Laboratory. No payment will be made under this item before any payment is made to the Independent Laboratory.

**iii) Existing services**

Provisional sum for the relocation of existing services (water mains, electricity cables/poles, etc) by Service utility. The name and contact details of the Training Company, to be appointed by the Contractor, will be supplied to the Contractor by the Employer or Employer’s Agent.

**iv) Overheads, charges and profit on (iii) above**

Handling costs and profit in respect of sub-item 8.5 (b) iii. A percentage of the payment to the Service Utility will be paid to the Contractor. The rate shall cover the Contractor’s overheads, changes, and profit on

payments for the Service Utility. No payment will be made under this item before any payment is made to the Service Utility.

**v) Training**

Provisional sum for training services supplied by the Training Company. The name and contact details of the Training Company, to be appointed by the Contractor, will be supplied to the Contractor by the Employer or Employer's Agent.

**vi) Overheads, charges and profit on (v) above**

Handling costs and profit in respect of sub-item 8.5 (b) 1. A percentage of the payment to the Training Company will be paid to the Contractor. The rate shall cover the Contractor's overheads, changes, and profit on payments for the Training Company. No payment will be made under this item before any payment is made to the Training Company.

**PS A 8.7 .....Daywork**

Replace A 8.7 with the following:

Daywork will be paid according to the percentage allowance method. For calculating the total remuneration, the General Conditions of Contract for Construction Works, Second Edition, 2015 shall apply, with the amendments as in the appropriate special conditions of contract, which is bound into this document. A daywork schedule will be provided for filling in the necessary information.

Daywork for various classes of labour and plant likely to be ordered under daywork during the course of the contract are as follows:

**PS A 8.7.1 .....Daywork (Labour)**

- a) Unskilled labour
- b) Semi-skilled labour
- c) Construction-hand and operator
- d) Foreman
- e) Steel fixer
- f) Welder

**PS A 8.7.2 .....Plant**

Tenderers to insert the hire rate at which each item will be charged that will cover all relevant costs of plant hire, including operating crew

- a) Lowbed transport of plant to and from site
- b) Mobile crane 5t at 3m radius
- c) Back acting excavators (Hitachi EX200 or similar)
- d) TLB
- e) Compressors (250CFM or equivalent)
- f) Tipper trucks (10t or equivalent)
- g) Water tanker
- h) Water pump
- i) Plate compactor
- j) Light delivery vehicles (1t or equivalent)
- k) Generator
- l) Disc harrow (mixture of soil for moisture)

**PS A 8.8 ..... TEMPORARY WORKS (See 8.1.2.1 (d))**



**PS A 8.8.1 Main Access Road to Works: construct and maintain ..... Unit: Sum**

The Contract shall construct an access road in accordance with the drawings provided by the Employer's Agent. The Contractor shall in addition maintain the main access road during the duration of the work.

**PS A 8.8.2 ..... Accommodation of traffic**

Traffic signs for deviation (size and type to be stated) ..... Unit: Sum

Provision of bypass (See section DM and see Subclause 1.3.3 of Section DM part 3 of the code) ..... Unit: Sum

**PS A 8.8.3 Protection of pump house structure until construction in vicinity is complete ..... Unit: Sum**

**PS A 8.8.4 ..... Existing Services**

- a) Supply (or hire) of specialist equipment for the detection of underground services (Provisional) ..... Unit: Sum
- b) The use of equipment for detection referred in item PS A 8.8.4 a) above ..... Unit: Sum
- c) Excavation by hand in soft material to expose service ..... Unit: m<sup>3</sup>
- d) Temporary protection, as required in terms of the project specification of existing service ..... Unit: Sum

**PS A 8.8.5 ..... Cost of the Survey in Terms of Land Survey Act**

- e) Trigonometrical survey beacons bench marks and plot boundary pegs – locate and expose before commencement of Works ..... Unit: Sum
- f) Trigonometrical survey beacons and plot boundary pegs – protect and re-establish located under Clause PS A 8.8.5 a), as ordered, by a Registered Land Surveyor on completion of the Works ..... Unit: Sum

**PS A 8.8.6 ..... River diversion (See Particular Specification: PA)**

Substitute A 8.8.6 with the following

- a) **Construction of cofferdam..... Unit: Sum**

Each cofferdam shall be scheduled separately. The sum shall include for the design, excavation of foundations through all materials, supply of materials from approved sources (including slope protection and impervious elements), construction, maintenance and removal.

- b) **Dewatering..... Unit: Sum**

The sum shall include for the provision, installation and continuous operation of adequate pumping units, including piping, power, temporary platforms and any other suitable equipment necessary to ensure that the area and excavations between the cofferdams is dewatered as required for construction purposes.

c) **Employer's Agented cut-off.....**  
**Unit: m<sup>2</sup>**

The rate shall include for the establishment and subsequent disestablishment of all necessary plant, and the creation and removal of all working platforms and access road for the forming of a contiguous row of *in situ*, jet grout columns to form the cut-off through the cofferdams and their foundations down to bedrock. The rate include for all measure to ensure that excess grout/bentonite does not pollute the river or any other watercourse. Measurement shall be the area of the columns calculated from the nominal width of ach column multiplied by its depth.

d) **Payment**

The Employer's Agent shall certify for payment 70% of the tendered sum on completion of the cofferdam construction. 25% shall be certified for payment as equal monthly sums for the period shown by the Contractor's approved programme during which the cofferdam is required. The balance shall be certified for payment either on removal as specified or when the cofferdam is no longer required.

The tendered sum for dewatering will be certified as equal monthly sums for the period shown by the Contractor's approved Programme for the diversion sequence.

**SABS 1200 PS C: SITE CLEARANCE**

**PS C 1 SCOPE**

Add the following to C 1:

This specification also covers the requirements for clearing the dam reservoir of trees, scrub, buildings, cattle pens, fences, pumps, reservoirs, bridges, private power lines and telephone lines, cattle dips, graves and cemeteries and any other item in the reservoir and to remove, relocate or dispose of any or all of the foregoing in accordance with this specification and the Drawings and the instructions of the Employer's Agent.

**PS C 2 INTERPRETATIONS**

**PS C 2.3 DEFINITIONS**

Add the following to C 2.3:

Debris. Loose natural material consisting especially of broken pieces of rock, scattered pieces of rubbish and any other remains.

**PS C 3 MATERIAL**

**PS C 3.1 Disposal of Material**

Substitute the first sentence of C 3.1 with the following:

Material obtained from clearing and grubbing shall be disposed of at the site indicated by the Employer's Agent. If such a site is indicated at the tender stage, the cost of transporting material and debris will be included under 8.2.1. Where no such place for disposal of material is indicated by the Employer's Agent, the Contractor shall make his own arrangements for the provision of a suitable place. The disposal, or burning if specifically permitted, of combustible material on site may be done only with the prior written approval of the Employer's Agent. Care shall be taken to observe the provisions of the Atmospheric Pollution Prevention Act, 1965 (Act 65 of 1965), and any regulations published in terms of the Act.

All three trunks and branches of girth exceeding 0.5m shall be stripped of secondary branches, sawn into transportable lengths and stacked at designed sites. Such timber shall not be used by the Contractor for any purpose, and shall remain the property of the Employer.

Fencing wire shall be neatly wound into rolls or coils and all such wire, together with all fence posts and other re-usable material from structures, etc, shall be stacked at designated on the Site.

Loading and off-loading should be done by hand and the contractor must price accordingly under item 8.2.1.

**PS C 5 CONSTRUCTION**

**PS C 5.2 Cutting of Trees**

**PS C 5.2.3 Preservation of Trees**

**PS C 5.2.3.2 Individual Trees**

Add the following to C 5.2.3.2:

Trees within the construction area must be left standing and undamaged, except where otherwise ordered in writing by the Employer's Agent.

A penalty of **R15 000,00** per tree for trees damaged and/or removed will be charged.

**PS C 5.3 CLEARING**

Add the following to PS C 5.3:

- g) The fencing on the right bank of the dam must only be removed and re-erected at the positions as indicated and approved by the Employer's Agent and repaired where it was damaged. When the construction area or access road cross fencing or gates temporary wire gates must be provided that must be kept closed. After completion of the work these fences or gates must be repaired to the same condition as before commencement of work.

**PS C 8 MEASUREMENT AND PAYMENT**

**PS C 8.2 Scheduled Items**

**PS C 8.2.1 Clear and grub the area designated by the Employer's Agent ..... Unit: ha**

The removal of all rocks and boulders on site over 0.15 m<sup>3</sup> will be paid under sub-clause D 8.3.2 (b).

**PS C 8.2.3 Remove and grub all trees and tree stumps regardless of girth..... Unit: No**

In exceptional circumstances, where construction is carried out through plantations or where the quantity of trees or girth exceeding 1m renders individual measurement impracticable the Project Specification may provide that clearing and grubbing of trees be measured in hectares. If this method of measurement is used the areas to which it is applicable will be defined clearly on the drawings and the reason for adopting the method of measurement will be stated in the project specification.

The rate shall cover the cost of all operations specified in 8.2.2.

**PS C 8.2.5 Take down existing fences and replace with new fence ..... Unit: km**

The rate shall cover the cost of taking down the fence, coiling wire, spring stacking all material at sites indicated by the Employer's Agent and the cost of loading, transporting, and offloading such material. The rate shall also cover the cost of replacing the existing fence with a new fence.

**PS C 8.2.6 Clear hedge ..... Unit: m**

The rate shall cover the cost of uprooting and disposing of each hedge complete with roots or the removing of each fence complete with all wire, posts, and other materials, as applicable.

**PS C 8.2.7 a) Dismantle and remove pipelines (not encased in concrete), electricity transmission lines, cables ..... Unit: m**

Separate items will be scheduled for each type and diameter (or group of diameters) of pipeline (not encased in concrete), each type of transmission line, cable, etc.

The rate shall cover the cost of dismantling, lifting and disposing of each pipeline, transmission line, and cable and the additional cost of precautions required during excavation in their vicinity, but not the cost of excavation and backfilling. Excavation and backfilling will be measured separately.

**PS C 8.2.7 b) Dismantle and remove pipelines (encased in concrete) ..... Unit: m**

Separate items will be scheduled for each type and diameter (or group of diameters) of pipeline encased in concrete.

The rate shall cover the cost of dismantling, lifting and disposing of each pipeline and the additional cost of precautions required during excavation in their vicinity, but not the cost of excavation and backfilling. Excavation and backfilling will be measured separately.

**PS C 8.2.8 a) Demolish and remove structures/buildings ..... Unit: Sum**

Separate items will be scheduled for each structure that is too large to be included as part of the clearing operations covered by C 5.3.

The rate shall cover the cost of all such separate items specified in the project specification.

**PS C 8.2.8 b) Dismantle steelwork ..... Unit: Sum**

Separate items will be scheduled for steelwork that is too large to be included as part of the clearing operations covered by C 5.3.

The rate shall cover the cost of all such separate items specified in the project specification.



## SABS 1200 PS D: EARTHWORKS (DAM)

### PS DB 1 SCOPE

This specification covers earthworks carried out with heavy plant or light plant, or by hand, for general excavations, short trenches, terracing and landscaping. It covers requirements for siteworks, excavations for foundations for bridges, buildings and general structures. It deals with safety precautions, classification of materials, excavation, filling, compaction and finishing.

This specification also covers the foundation preparations for an earthfill dam, the obtaining of materials from the excavations, borrow pits and quarry to be used in the various zones of an earthfill dam embankment together with the requirements for handling, processing, loading, transporting, placing, spreading, conditioning, compaction and testing of such materials, and shaping and protection of the embankment slopes.

### PS D 2 INTERPRETATIONS

#### PS D 2.3 DEFINITIONS

Add the following to D 2.3:

For the purpose of this specification the definitions and abbreviations given elsewhere in this document and the following definitions shall apply :

Approved laboratory. A laboratory suitably equipped and staffed for purposes of earthworks and aggregate testing and as such approved by the Employer's Agent (They will be SANS accredited or managed in terms of SANSA 17025).

Filter or drain material. A material such as a fine aggregate, or a sandy material having pore sizes that are fine enough to prevent the migration of soil particles from a soil mass adjoining it.

Optimum moisture content (OMC). The moisture content at which the maximum dry density occurs in the standard compaction test, which for an earth fill dam will be the Standard Proctor Test and for the roads and other infrastructure MOD AASTHO as per SANS 3001-GR30-2015.

Proctor density. The maximum dry density determined at OMC in accordance with the Standard Proctor test method given in ASTM D 698.

Relative Density. Relative density is the state of compactness of a soil with respect to the loosest and densest states at which it can be placed. This is applicable to non-cohesive materials which do not have well-defined moisture/density curves. (ASTM D2049)

Rip-rap. A surface layer of approved rockfill material placed to a specified controlled thickness.

Slope protection. Slope protection comprises the outer zone of an embankment and can consist of topsoil and grass, suitable gravel or transition layers and riprap.

Transition zone. These zones are located between different earthfill materials and/or filter materials and/or the riprap.

Zone (of an embankment). A section of a dam wall that is wholly constructed with material that conforms to a particular set of physical characteristics that are different from those of the material of an adjoining zone.

### PS D 3 MATERIALS

Add the following to D 3:

Materials for construction of the zones of the embankments shall only be obtained from the designated borrow pits or quarries from the selective use of material from the excavations or from other sources as directed or approved by the Employer's Agent.

The materials used in filter zones, drains, transition zones and riprap shall where applicable be obtained by means of controlled blasting techniques, crushing, screening, blending, washing or by such other methods as the Employer's Agent may from time to time approve. Where materials are blended the Contractor shall provide means to the approval of the Employer's Agent for such batching and blending. The methods and durations of mixing of the materials shall all be subject to the approval of the Employer's Agent prior to commencing and during the execution of the work. The Contractor shall perform such tests as the Employer's Agent may approve or subsequently order to develop a satisfactory blending technique and, such additional routine tests to ensure that the desired uniformity of quality and grading are maintained.

The water used for washing or compacting the embankment materials shall be free from objectionable quantities of silt, organic matter, salts or other suspensions that might detrimentally affect the material properties.

The material being placed in any layer of any particular zone shall be homogeneous, uniformly graded and at all times conform to the grading and other specified properties. The Contractor's methods of transporting, placing, spreading, mixing and compacting the materials shall not cause excessive degradation or segregation to ensure that the finally placed and compacted material conforms to the specified requirements. Where grading envelopes have been specified the mass of material actually retained in any size fraction shall be within the limits defined by the grading envelopes unless otherwise approved by the Employer's Agent.

The quality of the materials placed in the embankments and the methods of obtaining and processing the materials shall at all times be subject to the approval of the Employer's Agent who shall be at liberty to order the Contractor from time to time, to operate from any of the approved sources of supply. Any stockpiled material no longer conforming to the specified requirements or able to yield a uniform product shall be reprocessed by the Contractor and to the satisfaction of the Employer's Agent.

#### PS D 3.2 CLASSIFICATION FOR PLACING PURPOSES

Add the following to D 3.2:

##### PS D 3.2.4 Topsoil

- Topsoil shall consist of fertile loamy soil obtained from excavations for the dam, access roads and borrow pits for earthworks to be cleared or excavations for other structures. Preference shall be given to obtaining topsoil for grassing or landscaping from areas with a good soil coverage of natural vegetation, preferably grasses. Ideally topsoil shall be comprised of 15% to 25% clay (particle sizes less than 0,002mm), up to 10% silt (particle sizes between 0,002mm and 0,060mm) and 65% to 75% fine and medium sand (particle sizes between 0,060mm and 0,60mm) and shall have a pH of between 6,0 and 7,0. Topsoil shall be free of deleterious salts and other matter such as large roots, stones larger than 25mm, refuse, stiff or heavy clays and the seeds of weeds, which could adversely affect its suitability for the grass being planted. Topsoil for use in the Works shall not be stripped, collected or deposited while wet.
- Topsoil removed from other portions of the Works shall immediately be deposited in final position to the extent possible, failing which the topsoil required for the Works shall be conserved and stockpiled as approved by the Employer's Agent. Topsoil to be conserved shall be stockpiled by dumping in separate heaps not exceeding 2m in height and in such a manner as to minimise leaching. Compaction of the stockpiled or placed topsoil shall be prevented.

**PS D 3.2.5 Rock Suitable for Concrete, Filters and Riprap**

Rock which is suitable for concrete aggregates as specified in **SANS 1200 G 3.4** and/or filters and riprap as specified below shall be used for that purpose.

a) Filter, Drain and Transition Zone Materials

Sands and gravels required for use in drains, filters and transition zones shall be clean and shall conform to the gradings given on the Drawings and the requirements stated in **SANS 1200 D 3.1**. Where necessary aggregates shall be washed with approved washing plant to ensure that the grading and other quality requirements are complied with.

The Contractor shall construct storage facilities that :

- i) provide adequate capacity to ensure no interruption to the construction,
- ii) provide separate storage areas for different types and sizes of material,
- iii) ensure there is no intermixing nor contamination by deleterious matter,
- iv) ensure there is no segregation, and
- v) by restricting the height of the stockpiles, ensure that no breakdown of particles takes place.

The coarse aggregates shall meet the minimum requirements of stone for concrete as specified in Table 2 of SANS 1083 and shall not have any property which, in the opinion of the Employer's Agent, could adversely affect the functioning of the filter, drain or transition zone.

Should the Contractor be unable or elect not to produce the materials as crusher run then the coarse aggregates shall be separated and separately stockpiled in applicable sizes of stone.

The coarse aggregate shall meet the prescribed requirements of the 10% FACT value for a concrete not subject to surface abrasion. The coarse aggregate shall be tested for the following properties:

- i) Shape (as indicated by voids content). Testing shall be conducted in accordance with SANS 5845 and the voids content shall not exceed 48%.
- ii) Soundness. When tested in accordance with ASTM C88 (sodium and magnesium sulphate method), the coarse aggregate shall not show a loss in mass of more than 8%.
- iii) Abrasion resistance. The abrasion resistance when tested in accordance with SANS 5846 shall not exceed 48%.
- iv) Flakiness index. Testing shall be carried out in accordance with SANS 5847 and the flakiness index shall not be more than 35%.

In addition all the non-soluble deleterious materials including materials of low density in each size fraction shall not exceed 3% by mass.

The fine aggregates used in filters shall meet the requirements of sand for concrete in SANS 1083 unless otherwise approved by the Employer's Agent and shall have no property which, in the opinion of the Employer's Agent, could adversely affect the functioning of the filters.

The fine aggregate may be of either class specified in Table 1 of SANS 1083 or may be a blend of both classes. The specified filter gradings shall be achieved by the blending of at most two types of sand. Different types and classes of sand shall be separately stockpiled.



The fine aggregate shall be tested for the following properties:

- Content of material of low density.
- Soundness. When tested in accordance with SANS 5847 (sodium sulphate method), the fine aggregate shall not show a loss in mass of more than 8%.
- Other impurities.

In addition all the non-soluble deleterious materials including materials of low density in any size fraction shall not exceed 2% by mass.

In general and unless otherwise approved by the Employer's Agent these materials shall comply with the requirements for concrete aggregate in SANS 1083 with the following modifications :

- The dry 10% FACT value shall be not less than 110kN.
- The wet 10% FACT value shall be at least 75% of the determined dry value.

b) Riprap

All stone for riprap shall be of rock of a petrographic type approved by the Employer's Agent and shall be quarry or excavation run processed only to remove excess fines or to remove or degrade oversize particles and shall meet the following requirements :

- i) Be hard, dense, durable quarried rock that is free from weathering, cracks, seams and other defects that will cause rapid or excessive deterioration or degradation during service.
- ii) Conform to the grading given on the Drawings (see **Clause PS D 7.5**) and the requirements stated in **PS D 3**, and
- iii) Contain not more than 5% by mass in total of impurities (undesirable material) such as individual pieces of riprap which do not meet the quality requirements as specified and which can be visually differentiated from satisfactory pieces, plus dirt, sand, clay, rock fines and material of low density.
- iv) The specific gravity of the individual particles shall be greater than 2,60.
- v) The dry 10% FACT value determined in accordance with SANS 5842 shall be not less than 110kN.
- vi) The wet 10% FACT value determined in accordance with SANS 5842 shall be not less than 75% of the determined dry value.
- vii) The loss after 5 cycles measured by the sodium sulphate soundness test (see Clause PS D 7.5
- viii) The Quality Control Plan must provide the method for grading of the Rip-Rap.

**PS D 3.2.6 Material Suitable for Landscape Fill**

Material to be used for landscape fill shall not be suitable for any other use in the Permanent Works, shall be free of stumps and trees, may contain topsoil and may contain stones and boulders of maximum dimension up to 150 mm, provided that the volume of stones and boulders does not exceed 25 % of the volume of the placed landscape fill.

**PS D 3.2.7 Rock Spoil for Protection of Embankment Toe**

Rock which is not suitable for concrete, filters and riprap, but which meets the requirements indicated on the Drawings for rock spoil for protection of embankment toe shall be used for that purpose.

**PS D 3.2.8 Unsuitable Material**

Excavated material which is not suitable for any use as specified above or in excess of that required for landscape fill as specified in **PS D 3.2.6**, shall be disposed of in areas as shown as agreed with the Employer.

**PS D 3.2.1 Material Suitable for Embankments and Terraces**

Substitute D 3.2.1 with the following:

**Material Suitable for Dam Embankments**

Earthfill materials for the core and outer shells of the embankments

- a) shall be free of roots, stumps, topsoil, organic matter and other deleterious materials,
- b) shall conform to the size limits, grading envelopes and physical properties given on the Drawings,
- c) shall be compactable to the density specified, and
- d) may contain isolated individual particles of maximum dimension up to two-thirds of the compacted layer thickness, provided that the volume of these particles does not exceed 5% of the volume of the compacted layer.
- e) The core material must adhere to:
  - i. Grading more than 60% through the 0.42mm sieve
  - ii.  $10 < \text{clay} < 30\%$
  - iii.  $30 < \text{LL} < 60\%$
  - iv.  $12 < \text{PI} < 35$
  - v.  $4 < \text{LS} < 10$
  - vi.  $1459 < \text{MDD} < 1880$
  - vii.  $14 < \text{OMC} < 25$
  - viii.  $18 < \text{internal friction} < 30 \text{ degrees}$
  - ix.  $12 < \text{Cohesion} < 24$
  - x. Permeability  $< 1 \times 10^{-4}$
- b. The outer shell material must adhere to:
  - i. Grading more than 40% through the 0.42mm sieve
  - ii.  $\text{clay} < 10\%$
  - iii.  $\text{LL} < 60\%$
  - iv.  $4 < \text{PI} < 12.5$
  - v.  $7 < \text{LS} < 0$
  - vi.  $1750 < \text{MDD} < 2100$
  - vii.  $16 < \text{OMC} < 16$
  - viii.  $28 < \text{internal friction} < 38 \text{ degrees}$
  - ix.  $\text{Cohesion} < 12$
  - x. Permeability  $> 1 \times 10^{-4}$
  - xi.

**PS D 3.2.3 Material Suitable for Backfill or Fill against Structures**

Material used for backfill against structures shall comply with the requirements of the appropriate zone material used for the dam embankments as specified in **PS D 3.2.1** above.

**PS D 4 PLANT**

**PS D 4.1 GENERAL**

Add the following to D 4.1

An adequate number of suitable tools, including hand stampers, wheelbarrows and hosepipes shall be provided by the Contractor. The Contractor will supply mechanical compaction equipment and when required pneumatic and rock breaking equipment.

All excavations exceeding the specified widths shall be backfilled with approved selected material. No payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates.

**PS D 4.2      COMPACTION PLANT**

The plant used for controlling the moisture content, grading or mixing, spreading and compacting materials shall be capable of achieving the specified density with the materials available for the construction of the Works as specified in **D 3.2 and PS D 3.2. A disc harrow can effectively control soil moisture content for compaction.**

**PS D 5      CONSTRUCTION**

**PS D 5.1      PRECAUTIONS**

**PS D 5.1.1      Safety**

PS D 5.1.1.3      Explosives

Add the following to D 5.1.1.1:

When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any overbreak allowance specified. In deep excavations the Contractor shall generally perform the excavation in two or more stages, reducing the depths of and the distances between holes and the charge levels in the final stage.

The Contractor shall at all times provide full facilities for the Employer's Agent or his Representative to check all stages of the drilling and blasting operations.

**PS D 5.1.3      Dealing with water**

Add the following to D 5.1.3:

The Contractor's responsibility in terms of **Particular Specification: PA** (River Diversion) will be held to include the provisions of adequate protection against flooding and damage by stormwater, flow from springs and seepage and to include provision for the repair, at the contractor's expense, of any damage to the Works that may arise as a result of the inadequacy of the protection provided by the contractor. For this purpose the Contractor shall provide, operate and maintain in sufficient quantity such pumping equipment, well points, pipes and other equipment as may be necessary, and the contractor shall also provide any sumps, furrows, catchwater drains or other measures as may be necessary to minimise damage, inconvenience or interference. The Contractor shall examine such provisions in conjunction with the design of the diversion system specified in **Particular Specification: PA** (River Diversion).

**PS D 5.2      METHODS AND PROCEDURES**

**PS D 5.2.1      Site preparation**

PSD 5.2.1.2      Conservation of topsoil

Add the following to D 5.2.1.2:

The Contractor shall notify the Employer's Agent sufficiently in advance of the commencement of any removal of topsoil so that cross-sectional levels and measurements may be taken after the completion of clearing and grubbing.

The Contractor shall remove from the areas in which excavation is to take place the top root zone including topsoil, grass and other vegetation. The material shall be stockpiled by dumping in separate heaps not exceeding 2 m in height and in such a manner as to minimise leaching or shall be transported to spoil tips as directed by the Employer's Agent in accordance with the requirements of **Particular Specification: PG**.

**PS D 5.2.2 Excavation**

Substitute D 5.2.2 with the following:

**PS D 5.2.2.1 General**

After removal of topsoil and prior to commencing with excavations, the taking of cross-sectional elevations and measurements shall be repeated. These surveys shall also be carried out at the completion of excavations and after the completion of secondary excavations when ordered and at any stage during the excavation operations as deemed necessary by the Employer's Agent, such as to suit the classes of excavation as specified in D 3.1 and when material is no longer being utilised directly but is being stockpiled for later use or is being spoiled.

Excavations shall be carried out to the payment lines and levels shown on the drawings or as directed by the Employer's Agent. Excavations outside these payment lines and levels shall be backfilled and compacted by the Contractor at his own expense with material (including concrete) as directed by the Employer's Agent. The required depth or level of excavation is indicated approximately on the Drawings and the Employer's Agent shall determine the final level at each point as excavation proceeds. The Drawings show the minimum base widths for each component and the Contractor shall determine the required top width at the commencement of excavation from the information given on the Drawings.

The Contractor shall obtain instructions before commencing excavations regarding any changes to the dimensions and slopes shown on the Drawings to suit localised ground conditions.

**When any excavation is completed, the Contractor shall notify the Employer's Agent so that he may inspect and map the excavation and the Contractor shall allow for this in the contractor's programme.** Prior to the inspection and mapping the Contractor shall remove all loose material, clean and survey the excavations to the extent necessary to allow an inspection and mapping the joints and other geological features. No placing of concrete or fill shall commence until this inspection and mapping is complete and the Contractor has received the Employer's Agent's written permission to proceed. The limits of the excavated area shall be clearly defined and recorded.

Excavated surfaces which will remain permanently exposed shall be finished off in neat and workmanlike manner and shall be graded to provide adequate drainage. All rocky material which is likely to become detached from permanently exposed excavated surfaces shall be removed to the satisfaction of the Employer's Agent.

Where rock support is shown on the Drawings, the excavation shall be carried out in stages of limited height and length such that :

- a) pre-support is fully installed and tensioned where applicable prior to excavation; and
- b) all remaining rock support may be installed and tensioned within 48 hours of excavating and to within 1,0 m of the next stage to be excavated, regardless of the excavation method, unless otherwise agreed by the Employer's Agent in writing.

Vertical rock faces or overhangs shall be cut back to a 1 vertical to 0,25 horizontal slope or backfilled with concrete to a 1 vertical to 0,25 horizontal slope or as shown on the Drawings or as instructed by the Employer's Agent.

The Contractor shall make every effort to identify the position of any existing underground services and shall take every precaution not to damage such existing services during excavation for the Works.

Where an excavation for pipes or services crosses a public or private road, the excavation and installation of the pipe shall be so conducted that access is provided to at least one lane of traffic. Suitable traffic control measures approved by the relevant local authority shall be maintained.

Suitable pedestrian access shall be provided where long excavation runs are constructed.

PS D 5.2.2.2 Method

At least 14 days prior to the commencement of excavations, the Contractor shall submit his Method Statements for the different types of excavation to the Employer's Agent for his approval.

The Method Statements shall include details of the plant he proposes to use, control methods to be used (such as batter boards, etc.), proposed measures for the control of water and the sequence and programme of his operation.

PS D 5.2.2.3 Phasing and Programming of Excavations

The Contractor shall phase and programme the excavations for the various components of the Works to the approval of the Employer's Agent taking cognisance of the following requirements as appropriate:

River Diversion

The proposed phasing of excavations for river diversion is detailed on the Drawings. (See also **Particular Specification: PA River Diversion**).

Concrete Works

Excavations for the concrete works shall be phased and programmed in accordance with the river diversion programme. (See **Particular Specification: PA River Diversion**).

Concrete works are to be commenced before all excavations are completed and the Contractor shall take due cognisance of the limitations on blasting adjacent to structures as required in terms of **Clause PS D 5.3.9**.

Embankment

Unless approved by the Employer's Agent, excavations for the core trench shall only commence after the foundation for the embankment shells has been compacted, to ensure adequate compaction up to the top edges of the core trench.

PS D 5.2.2.4 Selection of Excavated Material

The Contractor shall programme and arrange his operations, working methods and depths of excavation such as to selectively excavate those materials (see **Clause PS D 3.2.1**) which are suitable for incorporation into the Permanent Works in order to minimise the volumes of spoil. As far as possible, these materials shall be transported directly to their final position in the Works or to a screening or processing plant without stockpiling. Where this is impractical, in the opinion of the Employer's Agent, the material that can be used in the Permanent Works shall be stockpiled at approved sites. The Contractor shall ensure that there is not excessive wastage of material such as rock suitable for concrete aggregates or filters due to contamination by unsuitable overlying material, stockpiling or re-excavation and loading.

In order to achieve the optimum use of excavated material the Contractor shall agree with the Employer's Agent with regard to the usage of excavated materials. The Contractor's operations in the excavations shall be such that the materials excavated will yield as much suitable material as possible.

Temporary stockpiles of material for later use in the Works shall be formed with side slopes which will remain stable under all conditions to which they will be subject and the tops shall be graded to prevent the ponding of water.

Stockpiles shall be placed so that watercourses are not obstructed or polluted and shall not obstruct any stormwater or drainage paths.

PS D 5.2.2.5 Placing of Landscape Fill

Material suitable for landscape fill as specified in **Subclause PS D 3.2.6** shall be transported directly to its final position as far as possible or may be stockpiled adjacent to its final position if it cannot be placed directly into its final position. Areas to be landscaped shall be filled and compacted (where specified on the Drawings) and shaped to the contours and forms as shown on the Drawings and to the tolerances as specified in **Particular Specification: PG**.

Final treatment of the landscape fill shall be carried out in accordance with **Particular Specification: PG**.

PS D 5.2.2.6 Disposal of Unsuitable and Excess Material

All material which must be excavated but is unsuitable for use in the Works shall be transported to spoil dumps as shown on the Drawings or otherwise ordered by the Employer's Agent. These spoil dumps shall be levelled and worked off to the lines and levels as shown on the Drawings or ordered by the Employer's Agent. Final treatment of these spoil dumps shall be as specified in **Particular Specification: PG**.

PS D 5.2.2.7 Slips and Over-Excavation

Slippages, excavation for working space, over-excavation and damaged areas shall be made good to the satisfaction of the Employer's Agent. In the case of surfaces on which or against which Permanent Works are to be constructed, this remedial work shall comprise replacing the slipped, over-excavated or damaged material with suitable filling material or with concrete as instructed by the Employer's Agent.

Slips, falls, subsidence and other damage which has the effect of removing or reducing support to existing or proposed structures, services and the like shall be made good in concrete or otherwise in a manner acceptable to the Employer's Agent.

In the case of permanently exposed surfaces, remedial work shall comprise replacing and compacting material similar to that which has been removed or replacing with concrete in order to provide a surface not less satisfactory than adjacent correctly excavated surfaces. If this is not possible, remedial works shall be as instructed by the Employer's Agent.

PS D 5.2.2.8 Excavated Surfaces

All excavated surfaces shall be finished neatly within the specified tolerances to the lines and levels shown on the Drawings.

Excavated surfaces that will remain permanently exposed on completion of the Works shall be cleared of all loose material, pieces of rock, debris, rubbish and the like and left neat and tidy. If required for subsequent grassing or for the establishment of natural vegetation the final surface of excavations shall not be absolutely smooth but shall have a slightly rough surface.

The exposed excavation surfaces against which concrete is to be placed shall be excavated with minimum overbreak. No material will be permitted to remain within the outline of structural concrete or within the payment line where specified.

Where, in the opinion of the Employer's Agent, the casting of concrete against the excavated surfaces is not acceptable the excavation of material required for the erection of formwork shall be agreed with the Employer's Agent.

In material other than rock, the horizontal surface shall be left undisturbed not less than 150 mm above its final level until immediately before commencing the stage of the construction which covers the foundation, at which time the excavation shall be completed by careful final trimming.

PS D 5.2.2.9 Slurry Trenches / Curtain Walls

Surface excavations for the Permanent Works and cofferdams may include excavations in permeable alluvial deposits below the water table. Thus, they will require sealing off prior to excavations taking place.

Where the Drawings show arrangements of slurry trench curtain walls below cofferdams and around excavations for the dam footprint and plunge pool in these alluvial deposits, this work shall be completed in accordance with the appropriate Particular Specification.

In all other instances, the Contractor shall design appropriate water barriers best suited to his method of construction and shall provide a Method Statement dealing with all aspects in achieving an effective seal in the alluviums.

**PS D 5.2.6 Blasting**

PS D 5.2.6.1 General

The Contractor shall submit to the Employer's Agent for his approval full details of his proposed methods for blasting and excavating. This submission shall include full details of the plant, materials, proposed hole sizes, depths and layouts, detonating sequences and delays, and charge levels together with a clear statement of his planned procedures. Due cognisance shall be taken of the requirements of **Clause PS D 5.4.9**. These details shall be submitted 14 days prior to the Contractor's intended start date for blasting a particular section. For each section, the Contractor shall consult with the Employer's Agent regarding the lines and levels required.

All accidents, injury to persons or damage to property or the Works shall be reported in detail and in writing to the Employer's Agent as soon as possible after the event.  
Only Chemical Blasting (Rock breaking) will be allowed near the existing concrete dam wall.

PS D 5.2.6.2 Preparation

The Contractor shall completely remove all overburden and weathered rock from above the area to be blasted for a suitable distance beyond the drilling limits.

This area shall be kept clear of all loose material until after the blast.

PS D 5.2.6.3 Notice to Blast

The Contractor shall give the Employer's Agent 14 days written notice of his intention to carry out a particular blast. This notice shall include details of the location of the blast, the detonating sequences and delays, the alignment, depth and size of drilled holes, the size and characteristics of the charges, the volume to be dislodged and the proposed time of the blast. If this information differs from that given under **Clause PS D 5.4.1**, the Contractor shall include the reasons for the change.

PS D 5.2.6.4 Care of the Works

The design of the blast shall ensure that there is no unnecessary shattering of the rock and the Contractor shall accept full responsibility for the quality of the remaining rock after a blast and shall make good at his own expense and as directed by the Employer's Agent, any over-excavation necessitated by such fracturing or displacement of the rock.

PS D 5.2.6.5 Control of Blasting

The explosives shall be of such quality and power and shall be used in a manner which will achieve the desired result. The layout, depths and sizes of the holes and the magnitude, distribution and delays and detonation sequences of the charges shall be such as to ensure that there is no damage to the rock at or below the final or founding level and that there is no excessive overbreak. The firing systems shall be controlled by the use of delay detonators except when used for presplitting or smooth blasting. (See **Clause PS D 5.4.8**). All charges shall be accurately made up and inserted into the holes at the correct spacing. All holes shall be properly stemmed and wired in the correct sequence to ensure the stated blast pattern and to eliminate the possibility of live charges remaining after detonation.

If, in the opinion of the Employer's Agent, the Contractor's method of drilling and blasting is considered or proved to be inappropriate to produce the results required, the Employer's Agent reserves the right to order the Contractor to modify his procedures.

Whenever, in the opinion of the Employer's Agent, the results of a blast are unsatisfactory and further blasting might cause damage to the rock on or against which concrete or embankment material is to be placed, the Contractor shall complete the excavation using wedging, barring, jackhammers or similar methods.

**PS D 5.2.6.6**    Safety Measures

The Contractor shall in accordance with all the statutory requirements agree with the Employer's Agent his proposed method of warnings, and movement of personnel prior to and after blasting. He shall ensure that this system is explained fully to all personnel on Site prior to commencing the first blast. The Contractor shall use mats or other types of cover to ensure that flying rock fragments are kept to an absolute minimum at all times.

**PS D 5.2.6.7**    Monitoring and Designing for Blasting Vibrations

The Contractor shall supply and operate two approved recording tri-axial particle velocity meters which shall be used as and where directed by the Employer's Agent. The Contractor shall design his blasting operations such as to ensure that the peak particle velocity does not exceed potentially damaging values in any permanent structure, as approved or directed by the Employer's Agent.

**PS D 5.2.6.8**    Perimeter Blasting

The Contractor shall submit to the Employer's Agent for his approval, full details of his proposed method for presplitting or smooth blasting.

The Contractor shall perform a trial section of presplitting or smooth blasting at a location agreed with the Employer's Agent. The trial shall comprise a 10 m length of excavation and at least 2 m deep.

The length of any one section to be presplit or smooth blasted shall not exceed 25 m, unless otherwise approved by the Employer's Agent. Drilling shall only commence after previously presplit or smooth blasted holes have been exposed to confirm the quality of the surface.

The holes drilled for presplitting or smooth blasting shall be not greater than 65 mm diameter. The Contractor shall limit the hole depths and employ experienced personnel and suitable drilling equipment to ensure that no hole shall deviate from the plane of the proposed slope nor shall any hole deviate in the plane of the slope by more than one-third of the planned horizontal spacing of the holes.

The layout of the holes shall be determined to provide a uniform shear face between the holes. The magnitude and distribution of the charges shall not cause overbreak or shatter the surface or otherwise damage the rock behind the excavated surface, but in general the charge level shall not exceed 500 gm/m<sup>2</sup>. All charges within the pattern shall be detonated simultaneously using detonating cord.

**PS D 5.2.6.9**    Blasting Adjacent or Near to Structures



No blasting shall be carried out within 100 m of ground anchors or of grout or of concrete which is less than 7 days old or within 50 m of any concrete regardless of age, unless otherwise approved by the Employer's Agent. The Contractor shall take due cognisance of these limitations when programming his operations and shall at all times ensure that his blasts are designed so as not to cause damaging ground vibrations.

#### **PS D 5.2.7 Foundation Requirements and Secondary Excavations**

As a consequence of possible variations of the anticipated founding conditions, the dimensions and founding levels specified or shown on the Drawings may possibly have to be varied during construction.

The Contractor shall not be entitled to any additional payment for any such variation in the dimensions or founding depths over and above that provided in **Clause D 8.3**, irrespective of the stage of construction at which the instruction to alter the dimensions of founding depths is given. However, if in consequence of such order to alter the Contractor is compelled to substitute other machines and equipment for machines and equipment for successfully completing the work, the Employer's Agent may reimburse the Contractor at a fair price for incidentals incurred, provided that the original machines and equipment had been suitable for the work required prior to the order to alter having been issued.

##### **PS D 5.2.7.1 Excavation of Dam Foundations**

Wherever possible the dam foundations shall be excavated from the top to the bottom of the excavation. If for programme reasons the excavation has to be commenced at two different levels the Contractor shall take the necessary steps to protect the lower excavation from rock falls, or the upper excavation from undercutting.

The Employer's Agent may permit excavations to be undertaken as the embankment dam progresses if he is satisfied that an acceptable foundation will be achieved and that contamination of the various zones of the embankment will be kept to a negligible minimum.

The Contractor's work shall be programmed so as to minimise excavation by blasting adjacent to previously constructed parts of the Works. The Employer's Agent will not approve a programme in which, in his opinion, blasting may cause damage to existing works or their foundation. Where in the opinion of the Employer's Agent it would be impracticable to avoid damage to rock or adjoining works if explosives were used, the Employer's Agent may require the Contractor to continue excavating by line drilling as specified in **Clause PS D 5.2.6**, using a hydraulic breaker, barring and wedging, chemical blasting or other approved non-explosive methods.

Irregularities, steps and overhangs shall be removed by light blasting, barring, wedging, using breakers or other effective means. Steps less than 0.3 m in height and up to 1 m in length may, where approved by the Employer's Agent, remain without further treatment. Higher steps shall be cut back to a slope of 1:2,0 or backfilled with dental concrete.

Rock wedges on rock slopes which are not removed shall be anchored to sound rock as directed by the Employer's Agent.

##### **PS D 5.2.7.2 Concrete Foundations**

The excavated surfaces to receive concrete shall be cut to a firm surface either level, stepped or serrated as directed by the Employer's Agent. Any overhanging rock shall be barred loose. All loose material shall be removed from the surface which shall then be cleaned using high pressure air/water jets and scrubbing with brooms. At this stage, the Employer's Agent shall carry out a final inspection. If necessary the cleaning shall be repeated immediately prior to concreting.

Where the general quality of the rock is inadequate or where the rock contains lenses or fissures of unsuitable material which could endanger the foundation, the Contractor shall, when ordered by the Employer's Agent, extend the excavations by the depths ordered which shall not be less than 500 mm. The area of the extended or secondary excavations shall be determined by the Employer's Agent. This

process of excavation, cleaning, inspection and further excavation shall continue until an adequate foundation is achieved.

After the final acceptance of the foundation surfaces these shall be prepared in accordance with **Clause PS D 5.2.7.7** and **SANS 1200 PSG**.

Prior to drilling holes to receive dowels or rock anchors excavation shall be made to final grade and the area grouted as directed by the Employer's Agent from time to time and cleaned.

PS D 5.2.7.3 Embankment Core Foundations

Where the core of the dam embankments is founded on rock, the surface of the core contact area shall be cut, cleared and cleaned as specified in **Clause PS D 5.2.7.2**. Abrupt changes in section shall be removed and the surfaces shall be excavated to slopes not steeper than 1(V):2(H). The surfaces will be inspected by the Employer's Agent who may order secondary excavations as specified in **Clause PS D 5.2.7.2** until an adequate foundation is achieved. A blinding layer must be provided of 50 mm thick.

Where the core of the dam embankments is founded on soil, such as alluvial and residual materials, all organic and other deleterious and loose materials shall be removed. The surface will then be inspected by the Employer's Agent who may order secondary excavations. The minimum depth of secondary excavation shall be 200 mm over areas to be indicated by the Employer's Agent.

PS D 5.2.7.4 Embankment Shell Foundations

In general the embankment shells are founded on soil consisting of residual, alluvial or colluvial materials. The surfaces will be inspected and the materials will be tested by the Employer's Agent after removal of all organic and other deleterious and loose materials. Secondary excavations may be ordered to a minimum depth of 200 mm over areas to be indicated by the Employer's Agent.

In the case where rock is encountered the requirements as specified in **Clause PS D 5.2.7.3** shall apply.

After final acceptance of the foundation surfaces these shall be prepared.

PS D 5.2.7.5 Rockfill Embankment Foundations

Where the dam embankment is founded on rock, the surface shall be cut, cleared and cleaned as specified in **Clause PS D 5.2.7.2**. Abrupt changes in section shall be removed and the surfaces shall be excavated to slopes not steeper than 1:2. The surfaces will be inspected by the Employer's Agent who may order secondary excavations as specified in **Clause PS D 5.2.7.2** until an adequate foundation is achieved.

Where the dam embankment is founded on soil, such as alluvial and residual materials, all organic and other deleterious and loose materials shall be removed. The surface will then be inspected by the Employer's Agent who may order secondary excavations. The minimum depth of secondary excavation shall be 200 mm over areas to be indicated by the Employer's Agent.

After final acceptance of the foundation surfaces these shall be prepared.

PS D 2.5.7.6 Cut-off Walls and Grout Caps

These excavations shall be conducted in a manner that will prevent shattering of the sides and bottom of the excavation. Generally the rock shall only be removed by means of light blasting approved by the Employer's Agent if explosives are to be used. Sound rock against which the concrete will be cast or in the vicinity of existing structures shall be excavated by means of hand tools and approved mechanical equipment. If approved by the Employer's Agent perimeter blasting with light charges may be employed, but shall be discontinued wherever further blasting is likely to damage the surfaces upon or against which concrete is to be placed or is likely to damage nearby structures.

When the excavation for a cut-off wall or grout cap crosses a fault, fracture zone or seam it shall be carried to the depths and widths shown on the Drawings or ordered by the Employer's Agent to key the concrete into the rock. The excavation shall generally not be extended for more than 2 m beyond the general excavation profiles without the prior approval of the Employer's Agent. The excavations shall be safeguarded in accordance with the provisions of **Clause PS D 5.2.7.2**, but all supports shall be removed immediately prior to or during concreting.

After final acceptance of the excavated surfaces these shall be prepared in accordance with SANS 1200PSG.

#### PS D 5.2.7.3 Treatment of Dam and Spillway Foundations in Rock

##### Treatment of Joints, Cracks and Fissures

Joints, cracks and fissures shall be cleaned out to a minimum depth of 3 times their width or to a depth instructed by the Employer's Agent. The joints shall be flushed clean with water and cleaned with air before filling by one of the following procedures, or other methods as instructed by the Employer's Agent.

**Cement Mortar:** A mortar in the proportion 2:1:1 sand:cement:water shall be worked into the joint, crack or fissure to seal it completely.

**Cement Grout:** A cement grout in the proportion 1:1 cement:water shall be pumped through a pipe set at the bottom of the joint, crack or fissure until it is completely filled. Grout shall then be brushed across the top of the joint, crack or fissure to ensure a good contact with the sealing element.

Where cracks are small and narrow, the Employer's Agent may instruct that grout be brushed into such cracks to seal them.

##### Treatment of Faults, Dykes, Shear Zones and Zones of Poor Rock

Gougeable or weak material shall be excavated to a depth of three times its width or a minimum depth of 0,5 m or such other depth instructed by the Employer's Agent. The excavation shall be filled with Class 30/19 concrete or dental concrete or other filling as instructed by the Employer's Agent.

##### Local Treatment of Irregularities in the Dam Foundation

Irregularities such as holes, overhangs, steps, etc., shall be filled by one of the following means or other means as instructed by the Employer's Agent.

**Dental Concrete:** Concrete Class 20/19 shall be used where instructed by the Employer's Agent to fill voids and depressions in the foundation surface or to round off sharp changes in the profile of the foundation.

To ensure a good bond, the rock surface against which dental concrete is to be placed shall be thoroughly cleaned and moist at the time concrete is placed.

Where necessary it shall be compacted by ramming and vibration. Unless otherwise approved by the Employer's Agent, it shall be covered by fill material as soon as possible.

**Sprayed concrete:** Sprayed concrete (Guniting) shall be placed where instructed by the Employer's Agent. The surfaces on which the sprayed concrete is to be placed shall be thoroughly cleaned and moist at the time of placing with no free water retained in depressions.

Sprayed concrete shall be cured in accordance with the requirements of SANS 1200 PSG.

#### PS D 5.2.7.8 Confined and Trench Excavations SANS 1200DB

When excavation is being carried out in trenches, the Contractor shall follow the specifications of SANS 1200 DB. This shall not apply where pipework is installed under an embankment. In these cases, the specific requirements will be specified in the Scope of Works.

PS D 5.2.7.9 Cuttings

In addition to obtaining instructions before commencing bulk excavation in cuttings, the Contractor shall also obtain instructions regarding treatment of the in-situ material exposed after excavation.

If the Employer's Agent considers it necessary, he may instruct the Contractor to widen cuttings already completed or partially completed, by changing slopes, cutting benches or in any other way.

No specific tolerances are given, but excavation surfaces shall be finished to a standard generally attainable with proper care and workmanship, bearing in mind the nature of the material excavated. Care shall be taken not to undercut any slopes causing sections to have a steeper slope than specified.

PS D 5.2.7.10 Drains

Open Drains

Open drain excavation shall include all excavation required to construct a channel with a bottom width of less than 4 m or V-shaped channels with side slopes steeper than 1:4 and total width at the top of less than 5 m.

Open drain excavations shall be carefully carried out so as not to loosen the material outside the designed profile.

Subsurface Drains

The width of trenches for subsurface drains shall be 400 mm wider than the outside diameter of the drain or as otherwise shown on the Drawings. The depth of the trench shall be such as will allow the top of the drain to lie 200 mm below the formation or foundation level at the highest point. The gradient of any length of the drain shall not be less than 1 in 400 or as otherwise shown on the Drawings.

**PS D 6 TOLERANCES**

**PS D 6.1 Embankment Excavation**

The base widths shown shall be the minimum requirement to the elevation stated. Side slopes shall be not steeper than shown on the Drawings.

**PS D 6.2 Concrete Structure Foundations**

The permissible deviation on the sides of the excavation shall be minus 0 and plus 150 mm. The side slopes of the excavation shall be determined on Site by the Contractor to provide a stable slope, subject to approval by the Employer's Agent.

**PS D 6.3 Waterways**

Where the excavation is to receive a concrete lining, such as the apron slab, the permissible deviation on the invert shall be within 50 mm above and 100 mm below the specified level. In other instances, the permissible deviation on the invert level shall be within 100 mm above and 300 mm below the specified level. The permissible deviation on the width of the waterway shall be within -100 mm and +300 mm of the stated width at any level.

At no elevation or level shall there be any abrupt change in the line or level.

**PS D 6.3.1 Tolerances**

Except as otherwise specified or instructed by the Employer's Agent the tolerances on the completed excavation after clearing of the excavation faces shall be as follows:

+ 50 mm, - 50 mm      in elevation;  
+100 mm, -100 mm    in plan on the excavated surface as an average; and  
+ 500 mm, -500 mm    in plan locally.

Soft material shall be excavated to rock or to the lines and levels shown on the Drawings, or to lines and levels as directed by the Employer's Agent. Rock shall be excavated to the lines and levels shown on the Drawings, or to lines and levels as directed by the Employer's Agent.

Rock surfaces to be covered with concrete shall be excavated to the lines, levels and dimensions shown on the Drawings with the following tolerances:

+ 0 mm, -250 mm      in the vertical direction; and  
+ 250 mm, -0 mm      in the horizontal direction measured from the structure towards the rock face.

## **PS D 7      TESTING**

Substitute D 7 with the following:

### **PS D 7.1      Backfill Materials**

The materials shall be tested and meet the appropriate requirements of **SANS 1200 PSG (Concrete)**.

### **PS D 7.2      Selected Material**

Material selected in terms of **PS D 3.2.3** for use in the Permanent Works shall be tested in accordance with the appropriate specification.

### **PS D 7.3      Inspection of Pits and Boreholes**

Where shown on the Drawings or instructed by the Employer's Agent inspection pits shall be dug and boreholes drilled in foundations for the purpose of establishing the nature of the underlying ground. Tests shall be carried out in-situ and on samples recovered from the pits and boreholes as instructed by the Employer's Agent.

### **PS D 7.4      Inspection of Foundations**

Before any blinding concrete, bedding material or fill is placed, when the Contractor considers that a foundation is ready for construction of any part of the Works to commence, he shall inform the Employer's Agent in writing, who will either approve the foundation in writing or instruct any further work which he may consider to be necessary. The Contractor shall also cooperate with the Employer's Agent in allowing space and time for detailed geological mapping of the exposed excavation surface.

### **PS D 7.5      Grading Tests for Rip-rap**

The grading analyses shall be performed by the Contractor at the Contractor's Site laboratory or such other locality approved by the Employer's Agent.

The samples shall be separated into the size fractions shown on the Drawings using suitable standard square mesh screens or individual sizing squares as appropriate.

The dry mass of the materials shall be determined using appropriate platform and other scales.

To assist with the visual control of the riprap grading the Contractor shall make up two samples of riprap, each up to 15 tonne in mass to the gradings of the coarse and fine limits of the specified riprap grading envelope.

A representative sample shall be obtained and the whole sample tested.

Samples for every 1000 m<sup>3</sup> or once a week are required.

The Employer's Agent must be present when sampling.

This method must be included in the QCP of the contractor.

**PS D 8 MEASUREMENT AND PAYMENT**

**PS D 8.3 SCHEDULED ITEMS**

Add the following to D 8.3:

- PS D 8.3.14 Scarifying area to receive grassing (horizontal and sloping) ..... Unit: m<sup>2</sup>**
- PS D 8.3.15 Supplying and applying chemical fertiliser at 50g/m<sup>2</sup> on horizontal ..... Unit: m<sup>2</sup>**
- PS D 8.3.16 Fertiliser ..... Unit: t**

## SABS 1200 PS G: CONCRETE (STRUCTURAL)

### PSG1 SCOPE

This specification covers the requirements for structural concrete work (plain and reinforced) for civil Employer's Agenting and building construction. It covers the basic materials, the plant and formwork required, the quality, manufacture, and curing of the concrete, tolerances in workmanship, tests and acceptance criteria, and the methods by which the finished structure is to be measured for the purpose of payment.

### PSG 2 INTERPRETATIONS

#### PSG 2.3 DEFINITIONS

Add the following to G 2.3:

Built-in parts. Built-in parts shall be deemed to refer to all reception frames and guide frames and similar parts of the hydraulic steelwork cast within second stage concrete after erection.

Cementitious Materials. Includes cement and Portland cement extenders

Embedded parts. Embedded parts shall be deemed to refer to all anchor plates or carrier channels or similar parts of the hydraulic steelwork cast in with the primary concrete.

### PSG 3 MATERIAL

#### PSG 3.2 CEMENT

##### PSG 3.2.1 Applicable Specifications

Add the following to G 3.2.1:

Portland cement that conforms to SANS 50197 Part 1: Composition, specifications and conformity criteria for common cements

##### PSG 3.2.3 Storage of Cement

Add the following to G 3.2.2:

Consignments of cement shall be used in the same sequence as that in which they are delivered on site. No cement shall be used which has been stored on site for a longer period than 6 (six) weeks. All cement so stored for a longer period than 6 (six) weeks, all cement damaged in any way, and all cement which does not comply with the specification, shall be removed immediately and permanently from the site.

Storage silos shall be painted white and clearly marked for the different cement types or extenders

#### PSG 3.4 AGGREGATES

##### PSG 3.4.3 Storage of aggregates

Add the following to G 3.4.3:

The Contractor shall construct storage facilities that :

- a) provide adequate capacity to ensure no interruption to the construction,
- b) provide separate storage areas for different types and sizes of material,

- c) ensure there is no intermixing or contamination by deleterious matter,
- d) ensure there is no segregation,
- e) ensure that the aggregates are shaded from direct sunlight during periods of adverse weather, and
- f) restrict the height of stockpiles to less than 3 m in order to prevent breaking down of particles.

**PSG 4 PLANT**

**PSG 4.1 BATCHING PLANT**

Substitute G 4.1 with the following:

**PSG 4.1.1 General**

The contractor shall ensure, by regular examination, calibration, and tests, that the batching system functions efficiently and accurately and that hoppers and cement containers are kept dry and clean. (The supplier must have adequate weights on site to verify the scales, once a week).

The Contractor shall ensure that, irrespective of the equipment used, batching of new material cannot proceed until the weighing hoppers have been completely emptied of the previous batch and the scales are completely in balance. When concrete production is initiated, the batching and mixing plant will have been adequately tested and calibrated to ensure complete compliance with the related specifications. Material not complying with this specification shall be rejected and any placed concrete shall be removed, as directed by the Employer's Agent.

**PSG 4.1.2 Materials Feed**

Aggregates shall be fed to the batch plant bins by an approved method. Hoppers shall have indicators and a light bar visual to the operator indicating level of aggregates. Where reclaim conveyors are used, there shall be at least two feeders per conveyor. The feeders shall be capable of adjustable feed rates controllable by the plant operator and by the plant's electronic control system.

**PSG 4.1.3 Bins and Silos**

Separate bins or compartments shall be provided for each size of aggregate. The bins shall have steep side slopes, large gate openings, and be capable of handling the aggregate in a damp condition without choking. The bins shall be so arranged as to avoid the possibility of cross contamination of aggregate sizes.

If so specified in the Project Specification, facilities for the introduction of chilled air for the cooling of aggregates in the batch plant storage bins must be applied.

**PSG 4.1.4 Weigh Batcher**

Aggregates shall be weighed in separate weigh batchers with individual scales and cements and pozzolans shall each be weighed on a separate scale in a separate weigh batcher. Water may be measured by weight. If measured by weight, it shall not be weighed cumulatively with another ingredient. Admixtures may be batched by weight or by volume. The weigh batchers shall be arranged so as to permit the convenient addition, or removal of material.

The batching and mixing plant shall have a realisable reserve capacity of at least 30 % of the required maximum placement rate.



**PSG 4.1.5 Water Batcher & Dispenser**

A suitable water measuring device shall be provided which will be capable of measuring the mixing water within the specified requirements for each batch. The mechanism for delivering water to the mixers shall be free from leakage when the valves are closed. The filling and discharge valves for the water batcher shall be interlocked so that the discharge valve cannot be opened before the filling valve is fully closed. When a water meter is used, a suitable strainer shall be provided ahead of the metering device. Water delivery pipes shall be free of leaks downstream of the measuring device.

The dispenser shall be interlocked with the electronic plant control and shall warn the operator and shut down the plant if insufficient liquid is available.

**PSG 4.1.6 Moisture Control**

The plant shall allow the simple adjustment of the materials batch weights to compensate for variations in the aggregate moisture content, as determined by manual measurement, or by moisture content probes.

Moisture Content of the aggregate shall be taken at least once a day

**PSG 4.1.7 Admixture Dispensers**

A separate batcher or dispenser shall be provided for each admixture. Volumetric dispensers shall be used only for liquid admixture and each plant shall be equipped with the necessary calibrated devices that will permit convenient checking of the accuracy of the dispensed volume of the particular admixture. The batching or dispensing devices shall be capable of repetitively controlling the batching of the admixtures to the accuracy specified. Piping for liquid admixtures shall be free from leaks and properly valved to prevent backflow or siphoning. The dispensing system shall include a device or devices which shall either detect and indicate the presence or absence of flow of the admixture, or provide a convenient means of visually observing the admixture in the process of being batched or discharged. Each system shall be capable of ready adjustment to permit variations of the quantity of admixture to be batched. Each dispenser shall be interlocked with the batching and discharge operations so that each admixture is added separately to the batch in solution in a separate portion of the mixing water, or of the fine aggregate, in a manner that ensures uniform distribution of the admixtures throughout the batch during the required mixing period. Admixture and water should be discharge together in a "hopper" first before it is added to the dry materials.

The nozzles of admixture dispensers shall be maintained in a clean and fully operational condition at all times.

**PSG 4.1.8 Scales**

Adequate facilities shall be provided for the accurate measurement and control of each of the materials entering each batch of concrete. Standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring device must be provided. Tests shall be made in the presence of the Employer's Agent prior to the start up of concrete placing and at least once a week thereafter. Each weighing unit shall include a visible springless dial which shall indicate the scale load at all stages of the weighing operation. The weighing equipment shall be arranged so that the plant operator can conveniently observe all dials and indicators. The minimum acceptable scale measurement accuracy shall be 0,5% in respect of water and cementitious materials and 1% in respect of aggregates.

**PSG 4.1.9 Cement, Pozzolan and Aggregate Feed**

Cement, pozzolan and aggregates shall be uniformly fed into the mixer by belt, auger, vane feeder or other acceptable method. The feed bins shall be equipped with a low level indicator that both warns the operator and can shut the plant down in case of insufficient material availability to ensure adequate materials for batching.

#### PSG 4.1.10 Operation and Accuracy

The measuring operation of each material shall start when actuated by one or more starting mechanisms and stop automatically when the designated weight or volume of each material has been reached. They shall be interlocked in such a manner that the discharge device cannot be actuated until the indicated quantity of material is within the applicable tolerance. The plant shall be arranged so as to facilitate the inspection of all operations at all times.

The control system shall be capable of changing mix designs instantaneously, producing at least 16 different mix designs, producing any of the mix designs at a variable production rate and tracking the mix change either to a hopper or a conveyer system. The control panel shall display the designed formula values and the instantaneous percentage values, or actual measured masses, for each ingredient and shall record the values at a present time interval, or on demand, with a multiple copy printer/recorder.

The plant control shall be automatic and shall not require manual intervention to adjust the material flow. The plant shall further possess the capability of full manual operation for a single concrete at a time, at limited production and for short periods, in the event of loss of electronic control. The electronic control system shall incorporate modular replaceable components to reduce down time in the event of a control system malfunction. An inventory shall be maintained of such replaceable components.

The moisture content of the fine aggregate shall be monitored using a device that takes measurements immediately prior to dispensing into the mix plant weigh out system.

Delivery of materials from the batching equipment shall be within the limits of accuracy given in **Table PSG 1**.

**Table PSG 1: Limits of Accuracy for Batching Equipment**

MATERIAL	PERMISSIBLE VARIATION (%)
Cement	+2
Pozzolan	+2
Water	+2
Aggregate smaller than 37 mm	+3
Aggregate larger than 37 mm	+3
Admixtures	+3

#### PSG 4.1.11 Recorders

An accurate recorder or recorders shall be provided for the aggregates and cementitious materials. The recorder shall note formula changes and shall print total quantities of each ingredient and total weights produced on demand. The weights or volumes of water and admixtures shall also be recorded. The recorders shall conform to the following requirements:

- a) The recorders shall produce a graphical record on a single visible screen and a digital record on a hard drive of the weight or volume of each material in the batchers at the conclusion of the batching cycle. A printed record shall be produced prior to delivery of the materials to the mixer. After the batchers have been discharged, the recorder shall reflect the return to empty condition.
- b) Graphical recording units shall be completely housed in lockable cabinets.

- c) The printed records shall be so marked that each batch may be permanently identified and so that variation in batch weights of each type of batch can be readily observed.
- d) The printed record shall indicate the time of day at intervals of not more than 15 minutes.
- e) The printed records shall become the property of the Employer's Agent.
- f) The recorders and readout screens shall be placed in a position convenient for observation by the concrete plant operator and the Employer's Agent.
- g) The recorded weights or volumes, when compared to the weights or volumes actually batched, shall be within the limits of accuracy specified in **Table PSG 2**.

**Table PSG 2: Limits of Accuracy for Recording Equipment**

MATERIAL	PERMISSIBLE VARIATION (%)
Cement & Pozzolan	+2
Water	+2
Aggregate	+2

**PSG 4.1.12 Batch Counter**

The plant or the mixers shall include a device for automatically counting the total number of batches of concrete mixed.

**PSG 4.1.13 Protection**

The weighing, indicating, recording and control equipment shall be sufficiently protected against exposure to dust, moisture and vibration to eliminate interference with the proper operation of the equipment.

**PSG 4.3 MIXING PLANT**

**PSG 4.3.1 General Requirements for Mixing Plant**

Add the following to G 4.3.1:

Worn or bent blades shall be replaced and inner surfaces of the mixer shall be kept clean and free of hardened concrete. Blades worn by more than 15 % of their depth shall be replaced. The mixers shall not be charged in excess of the capacity recommended by the manufacturer and the drum, or mixing blade speed designated by the manufacturer shall not be exceeded.

**PSG 4.3.2 Approval for Short Mixing Periods**

Mixers shall be batch type. Continuous mixers shall not be allowed. Only twin horizontal shaft mixers capable of thorough mixing of the constituent materials, split drum, or other approved types of mixer shall be used. The mixing period shall be sufficiently long to ensure the complete and thorough mixing of materials. It shall remain the Contractor's responsibility to prove the adequacy of the mixing time proposed. The plant shall be equipped with at least two interchangeable mixers, each of adequate reserve capacity for at least 30 % production above the required maximum concrete placement rate.

The Employer's Agent reserves the right to order that the mixing time be set to some period which, in his opinion, is required to achieve thorough mixing. The mixing time shall be increased when such increase is necessary to secure the required uniformity and consistency of the concrete. Excessive over-mixing requiring additions of water will not be permitted.

When the Contractor proposes to reduce the mixing time, three uniformity tests at the proposed (reduced) mixing time will be made under the supervision of the Employer's Agent. These tests will determine whether the reduced mixing time will produce concrete that meets the requirements of this specification. Suitable facilities shall be provided for obtaining representative samples of concrete for uniformity tests. All necessary platforms, tools, and equipment for obtaining samples shall be furnished.

In order to allow the consideration of a reduced mixing time, the Contractor must prove that, when tested for each of the following, each of three samples taken from the mix produced reflects variations within the ranges given in **Table PSG 3**, when compared to a mix produced according to the approved mixing time:

**Table PSG 3: Ranges of Variations in Mixing Times**

TEST	ALLOWABLE VARIATION COMPARED TO ORIGINAL MIXING TIME
Water content of mortar, percent by weight	85 – 115
Coarse aggregate content of concrete, percent by weight	90 – 110
Unit weight of air-free mortar	96 – 104
Cement content of dried mortar, percent by weight	80 – 120

#### **PSG 4.4 VIBRATORS**

Add the following to G 4.4:

Except for thin sections where vibrating shutters may be employed, the Contractor shall use suitably sized internal vibrators on the Works. The Contractor shall provide one standby vibrator for every three or less vibrators necessary for the rate of placing. Internal vibrators shall operate at a frequency of between 100 cycles per second and 200 cycles per second.

#### **PSG 4.5 FORMWORK**

##### **PSG 4.5.1 Design**

Add the following to G 4.5.1:

The Contractor shall submit for the Employer's Agent's approval, full details of the type and design of formwork proposed by him. This shall include details of all measures to ensure the safety of personnel working in and around the area affected by the concreting operation.

##### **PSG 4.5.3 Ties**

Add the following to G 4.4.3:

The type and design of any embedded tie employed in the Works shall be such that it can be installed with at least 50 mm clearance to any finished concrete surface or reinforcement. Ties shall be installed to a regular pattern and shall not mar the surface finishes. The Contractor shall submit details of all proposed ties to the Employer's Agent for approval.

#### **PSG 5 CONSTRUCTION**

##### **PSG 5.1 REINFORCEMENT**

##### **PSG 5.1.1 Bending**

Subject to the approval of the Employer's Agent and provided that the bars do not depend for their strength on cold working, bars of diameter 32 mm or more may be bent hot. They shall be heated slowly to a temperature not exceeding 840°C (cherry red heat) and after bending be allowed to cool slowly in air. Hot bars shall not be quenched in water. Except as provided for above, all bars shall be bent cold and this shall be carried out slowly with a steady, even pressure without jerking or impact. Already bent reinforcing bars shall not be rebent at the same spot.

**PSG 5.1.3 Cover**

Substitute G 5.1.3 with the following:

The cover of concrete over reinforcement, unless otherwise indicated on the drawings, shall not be less than 40mm. Any cover or spacer blocks used to maintain the concrete cover shall be as small as possible and be of an approved material and design.

If concrete spacer blocks are used it shall be of the same strength and quality as the concrete

**PSG 5.1.6 Cutting**

No flame cutting of high yield steel bars shall be permitted without prior authorisation from the Employer's Agent.

**PSGA 5.2 FORMWORK**

**PSGA 5.2.1 Classification of Finishes**

Substitute G 5.2.1 with the following:

In addition to complying with the tolerances specified in **SANS 1200 G Clause 6** of this specification, the class of surface finish on formed concrete surfaces as shown on the Drawings shall also comply with the following requirements:

**Class F1**

After repair work has been carried out to any surface defects in accordance with **Clause PSG 5.5.20**, no further treatment is required to the as-stripped surface. The finish of the concrete surface will not be more accurate than Degree of Accuracy I as defined in **SANS 1200 G Clause 6**.

Formwork may be either of timber or steel provided it does not leak mortar during concreting.

**Class F2**

Imperfections such as small fins, bulges, irregularities, surface honeycombing and slight surface discolorations shall be made good and repaired in accordance with **Clause PSG 5.5.20**. The finish of the concrete surface shall be accurate to Degree of Accuracy II as defined in **SANS 1200 G Clause 6**. All abrupt irregularities shall be removed by grinding on a bevel of 1:10 height to length ratio.

Formwork may be either of plywood or steel. The formwork shall be fixed rigidly to ensure no visual depressions or marks are formed on the concrete surface and such that the concrete surface will have a uniform texture without any stains.

Except where another class of surface finish is shown on the Drawings, Class F2 surface finish shall apply.

**Class F3**

This classification relates to surface finishes exposed to public view where appearance is of special importance. All projections shall be removed, irregularities repaired and the surface rubbed and

polished to obtain a smooth finish of uniform texture, appearance and colour over the whole surface, according to the process described in **Clause PSG 5.5.20**. The finish of the concrete surface shall be to a Degree of Accuracy III as specified in **SANS 1200 G Clause 6**. All abrupt irregularities shall be removed by grinding on a bevel of 1:20 height to length ratio.

Formwork shall only be approved plywood or tongue-and-groove boards, except in certain cases such as for precast units where permission may be granted to use steel formwork provided that sufficient vibration is used. All internal joints between formwork panels shall be sealed by means of adhesive sealing tapes as approved by the Employer's Agent in order to pre-vent the leakage of any mortar or moisture from the joints.

After treatment of the surface curing of the surface shall be ensured as specified in **Clause PSG 5.5.20**.

#### **Class F4**

This classification relates to special hydraulic surfaces where indicated on the Drawings. The finish of the concrete surface shall be to Degree of Accuracy IV as specified in **SANS 1200 G Clause 6**.

Formwork used shall have an absorptive lining, so that the concrete subjected to the flow of water is given a dense surface having a high degree of resistance to abrasion, free from voids, air holes and other defects. All internal joints between formwork panels shall be sealed by means of adhesive sealing tapes as approved by the Employer's Agent in order to prevent the leakage of any mortar or moisture from the joints.

The finish shall be of such a standard that no surface treatment is required after removal of formwork, except for the removal of abrupt irregularities as described for Class F3 surface finish and the specified curing.

### **PSGA 5.3 PIPES AND CONDUITS**

No pipes, conduits or other embedded items, other than those shown on the Drawings, shall be permanently embedded in the concrete without the prior approval of the Employer's Agent.

The Contractor shall ensure that any item to be cast into the concrete is securely fixed into position prior to beginning the concreting operation and in this regard the Contractor shall refer to requirements stated in the relevant specification. The special requirements for cooling of pipework during concreting and curing are stated in the relevant specification. The Contractor shall submit to the Employer's Agent for his approval, details of the methods proposed for fixture and protection during concreting. Any item to be cast into a concrete section shall be clean of all foreign matter which will reduce the bond or contaminate the concrete during placing. The Contractor shall ensure that any open ends are protected against the ingress of concrete into the pipe, conduit or other item being cast in.

### **PSG 5.5 CONCRETE**

#### **PSG 5.5.1 Quality**

##### **PSG 5.5.1.2 Consistency**

Add the following to sub clause G 5.5.1.2:

The slump carried out in accordance with SANS 5862-1 of concrete used in water retaining structures.

##### **PSG 5.5.1.3 Workability**

Substitute G 5.5.1.3 with the following:

The workability shall be measured in terms of the compacting factors and tests shall be carried out in accordance with SANS 5862. The compacting factors shall not be less than those given in **Table PSG 4** for the appropriate concrete class designation. The concrete shall be of such workability that it can be readily compacted into the corners of the formwork and around reinforcement without segregation of the materials or excessive bleeding of the free water at the surface.

**Table PSG 4: Requirements for strength of concrete**

CONCRETE CLASS DESIGNATION	GRADE (MPa)	MSA <sup>(1)</sup> (mm)	MAXIMUM W:C RATIO <sup>(2)</sup>	MINIMUM COMPACTING FACTOR <sup>(3)</sup>	SLUMP <sup>(4)</sup> (mm)	MINIMUM CEMENTITIOUS MATERIALS CONTENTS (kg/m <sup>3</sup> concrete)	MASS REPLACEMENT OF OPC WITH EXTENDERS (Percent of mass of cement replaced)			
							MGBS		FA	
							Maximum	Minimum	Maximum	Minimum
40/19	40	19	0,45	0,90	60 – 80	380	50	30	30	30
40/38	40	38	0,45	0,90	60 – 80	350	50	30	30	30
30/19	30	19	0,50	0,90	50 – 80	360	50	30	30	30
30/38	30	38	0,50	0,85	60 – 80	320	50	30	30	30
25/19	25	19	0,50	0,90	50 – 80	340	50	30	30	30
25/38	25	38	0,50	0,85	60 – 80	300	50	30	30	30
20/19	20	19	0,55	0,90	50 – 80	320	50	30	30	30
20/38	20	38	0,55	0,85	40 – 60	290	50	30	50	30
20/53	20	53	0,55	0,80	40 - 60	280	50	30	50	30
15/38	15	38	0,55	0,85	40 – 70	280	70	50	50	30
15/53	15	53	0,55	0,80	30 - 70	270	70	50	50	30

NOTES :

(1) The MSA is the maximum nominal size of coarse aggregate that may be present in the concrete mix of the particular concrete designation. The concrete mix of particular concrete designation shall contain aggregate of the MSA size designation in the proportion approved by the Employer's Agent generally to yield the maximum dry rodded density of the combined aggregates without the concrete mix showing any tendency to segregate or bleed.

The coarse and fine aggregates shall be so proportioned as to give, in the opinion of the Employer's Agent, a smooth curve of cumulative mass passing against grain size for the combined coarse and fine aggregates in the mix, subject to the other relevant requirements specified for the determination of the concrete mix proportions. Gap or skip graded mixes shall not be used.

(2) The maximum water:cement ratio and/or minimum cementitious materials content may not necessarily be consistent with the specified strength or other specified properties. The mixes shall be proportioned to ensure that neither the specified concrete strength nor the specified w:c ratio nor the specified minimum cementitious materials content nor the specified compacting factor are below the specified values.

(3) The compacting factor shall be the compacting factor, when using the small apparatus, of the fresh concrete when sampled after discharge at the point of final placement

(4) Fresh concrete when sampled after discharge at the point of final placement. The requirements of SANS 5862-1 prevail.

### PSG 5.5.1.5 Durability

Add the following to G 5.5.1.5:

Concrete shall be so proportioned to ensure that the water/cement ratio does not exceed 0,55 and, to ensure workability, water-reducing admixtures of approved manufacture shall be used in preference to increasing the cement content.

### PSG 5.5.1.7 Strength of Concrete

Add the following to G 5.5.1.7:

The grade of strength of concrete and the maximum normal size of coarse aggregate for each portion of the works, unless otherwise indicated on the drawings, shall be as follows:

- Blinding layers and encasing of pipes 20 MPa/19mm

• Benching	20MPa/19mm
• Screeds	20 MPa/10mm
• Reinforced concrete	35 MPa/19mm
• Mass concrete (Non overspill section)	20MPa/38mm
• Spillway concrete	35 MPa/19mm

### Mass Concrete

The Contractor must take into account the following when designing the concrete to be use in large volume pours (mass concrete):

- Concrete supply
- Casting sequence
- Cold joints
- Plastic settlement
- Heat of Hydration
- Early age thermal cracking

To mitigate the effect of the Heat of Hydration on the durability of the concrete the concrete mix shall be design for the following:

- The maximum temperature at any point within the pour shall not exceed 70°C (commonly), above 70 the formation of ettringite is greater
- The maximum temperature differential (temperature gradient) within a single pour shall not exceed 20°C (commonly), difference between the core and close to surface
- The maximum value of the mean temperatures between adjacent elements cast at the same time shall not exceed 20°C (commonly)
- The maximum value of mean temperatures between adjacent elements cast at different times shall not exceed 15°C (commonly) (in other words cast as soon as possible, this will allow the complete structure to cool down simultaneously without causing serious stresses due to restrain)

To achieve the above

- Concrete temperature must be as low as possible, preferably below 18°C. The higher the start temperature the higher the peak will be
- The concrete class should be specified for a 90 or 180 day strength, not 28days
- The Contractor should use the maximum stone size available = 53mm.
- 53mm stone should be blended with a 38mm and/or 19mm stone to produce a good mix grading.
- The Contractor should use the power45 curve to achieve the optimum grading
- This will also reduce the effect on shrinkage and plastic settlement with proper vibration (specify crack width <0.2mm for water retaining structures)
- Using the minimum allowable cementitious content
- Using the maximum allowable cement extender (Pozzolans slows down the hydration process therefore reducing the temperature gain over a certain period) you can go up to 60% for FA and 70% for GGBS

The Contractor should demonstrate the following before concrete is placed in the permanent works by constructing a test block 1m \* 1m \* 1m. Placing thermo couplers in the centre of the block and at least 200mm from the top and sides to monitor the temperatures. The block must be cured the same way as in the permanent works. No water curing(thermal shock). Block must be protected with high density polystyrene on all expose surfaces. Temperature must be monitored for at least 10 days.

### PSG 5.5.2 Batching



Add the following to 5.5.2:

All constituents of the mix shall be batched in the proportions determined by the trial mixes or as otherwise directed. Provision shall be made for determining the moisture content of the aggregates and adjusting the mass of aggregates and the quantity of mixing water accordingly throughout any particular concreting operation.

At the end of every week a concreting materials reconciliation statement shall be prepared by the Contractor of the cement and of each aggregate fraction that is in storage at the end of the week and that has been delivered and batched during that week as well as of each class of concrete cast during that week, and immediately be delivered to the Employer's Agent.

**PSG 5.5.3      Mixing**

**PSG 5.5.3.1    Mixing at construction site**

Add the following to G 5.5.3.1:

The mixing of materials for concrete shall be conducted by an experienced operator. The sequence of charging the mixing plant shall be approved prior to commencing the concreting operations and this sequence shall be maintained unless otherwise approved by the Employer's Agent. The minimum mixing periods shall be as approved by the Employer's Agent, but shall not be less than those recommended by the manufacturer. The maximum mixing periods, measured from the time when all the constituent materials are in the drum or pan to the commencement of discharge, shall not exceed 10 minutes and 6 minutes per batch for drum-type and pan-type mixers respectively. On commencing work with a clean mixer, the first batch shall contain only 50 % of the normal quantity of coarse aggregate so as to compensate for the finer materials which adhere to the mixer. This batch shall be mixed for at least a minute longer than the normal time.

The quantity of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer. No ingredients shall be added while the mixer is stationary and excessive over-mixing requiring the addition of water to preserve the required concrete consistency shall not be permitted. Any batch of concrete which cannot be discharged within the specified maximum mixing time shall not be used in the Works.

The discharge shall be arranged so that there is no segregation of the materials in the mix. The mixer shall be completely emptied before it is recharged. If the mixer has been out of use for longer than 30 minutes, it shall be thoroughly cleaned. Particular attention shall be given to removing any build-up of material in and around the mixer.

The additive should be preferably be added to the water first before adding to the mix

**PSG 5.5.4      Transportation**

Add the following to 5.5.4:

The Contractor shall submit full details to the Employer's Agent for his approval, of his proposals for transporting fresh concrete from the mixer to the placing points. These proposals shall ensure that there is no segregation, loss of ingredients or contamination by foreign matter. In addition, the

transporting system shall ensure that the mix is of the correct temperature and workability at the place and time of placing.

#### **PSG 5.5.5 Placing**

Add the following to G 5.5.5:

No concrete shall be placed when the temperature is at or below 2°C or when indications are that the temperature will drop below 2°C within the next 5 hours. This decision rests solely with the Employer's Agent. During cold weather, when the temperature remains below 2°C for extended periods, the concrete shall be protected by means of tarpaulins, straw covering or similar means, to the approval of the Employer's Agent, for at least 5 days after placing.

The Contractor shall give the Employer's Agent at least 24 hours notice in writing of his intention to place concrete in a particular section of the Works. This notice shall include the proposed time of commencement and the total volume of concrete to be placed. Concreting shall only be placed in any part of the structure after the forms, staging, reinforcing steel, concrete surfaces, waterstops, embedded parts, bearing assemblies and/or cable sleeves, mandrels and anchors, as well as preparations for casting have been inspected and approved in writing by the Employer's Agent.

Concrete or rock surfaces to receive concrete shall be prepared as specified in **Clause PSG 5.5.18**.

The concrete shall be placed and consolidated within 30 minutes of being discharged from the mixer unless otherwise approved by the Employer's Agent and approved agitators are used and at no stage shall it be re-tempered by the addition of water or any other material.

The forms to be filled shall be clean internally. All surfaces of an absorbent nature that are to come in contact with the concrete shall be dampened with water. There shall be no free water on the surfaces against which concrete is to be placed.

Immediately before concreting, any pools of water shall be blown from the concrete or rock surfaces. Thereafter a 20 mm thick mortar conforming to the requirements specified for foundation surfaces (**Clause PSG 5.5.18**) shall be applied just before starting to place the fresh concrete, taking care also not to let the mortar become dry or start to set. The concrete shall be placed immediately on the fresh mortar. If in the opinion of the Employer's Agent the local presence of persistent seepage may weaken the mortar as a bedding layer, a 19 mm concrete shall be used in lieu of the mortar as a bedding layer with the same grade as that of the concrete.

Wherever possible, the concrete shall be deposited vertically into its final position to avoid segregation and displacement of reinforcement and other embedded items. Deposited concrete shall not be so worked as to cause it to flow laterally. The Contractor shall provide all necessary chutes and baffles to avoid segregation. Concrete shall not be allowed to fall freely through a height of more than 1,5 m. Where a chute is used to convey the concrete, its slope shall be such as will not cause segregation and suitable spouts or baffles shall be used at the end of the chute or wherever the concrete drops vertically.

Concrete shall be placed in layers not exceeding 400 mm in thickness for mass concrete and 300 mm for reinforced concrete and approximately parallel to the horizontal and/or inclined construction joint planes. The minimum layer thickness shall be approved by the Employer's Agent for the type of construction and class of concrete being used. These layers shall be deposited across the full width

from one face to the opposite face until the full height of the lift is reached. Each layer shall be deposited on the previous layer before the latter has taken its initial set and in such a manner as to keep the exposed area of fresh concrete to a minimum. A new layer may be started before the previous layer has been completed. When closed circuits are being concreted, work shall commence at one or more points in the circuit and proceed in opposite directions at the same time so that on completion of the circuit the junction or junctions are formed with freshly placed concrete. The face of the concrete should be kept workable at all times.

If it is required that more than one class of concrete be used in a particular lift, the mix shall be changed at the appropriate surface without interruption of the concreting of the layer or lift as a whole. The contact surface shall at all times fall outside the zone of higher strength concrete shown on the Drawings.

Concrete shall not be placed during rain sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed sloping faces of fresh concrete nor in cold weather.

Concrete shall be placed as a continuous operation without interruption in lifts of generally constant height for each separate structure. The lift heights shall be as shown on the Drawings or approved by the Employer's Agent, which approval shall be obtained prior to commencing concreting in any particular portion of the Works. In mass concrete construction the lift height shall usually be between 1 200 mm and 2 400 mm, although lower heights of lift shall be used when casting fresh concrete on top of rock, on top of a cold joint or on top of concrete that is more than 14 days old. Concrete placed in other sections of the Works shall generally be placed in lifts not exceeding 2 400 mm but the Employer's Agent may authorise or instruct different heights to be used according to the section of concrete being placed, the type of formwork being used and whether cooling of the concrete is done or not. This is not applicable when filling large potholes or depressions in the foundations.

The Contractor shall obtain the Employer's Agent's prior approval for time intervals between lifts before commencing with the concrete work on any portion of the Works. The time interval between two consecutive lifts of concrete in the same block of mass concrete shall not be less than 24 hours for each 600 mm of height of lift (depending on the temperature difference), although the Employer's Agent may authorise a reduced interval of time depending on the geometric proportions and temperatures of the lifts being cast. The maximum time interval to be allowed between consecutive lifts shall vary between 24 hours and 72 hours for each 600 mm of height of lift for thin and mass concrete sections respectively, after which a construction joint shall be treated as a cold joint, i.e. as if the concrete were more than 14 days old.

The time interval between adjacent concrete lifts at the same elevation, but separated by contraction joints shall vary depending on the location and the distance between contraction joints. Intermediate sections shall generally not be cast within 14 days of the adjacent sections being cast, but as this is governed by the distance between contraction joints and the requirement that the adjacent concrete sections should have passed their peak temperatures and to minimise the width of contraction joints, the Contractor shall obtain the prior approval of the Employer's Agent as to the time intervals to be allowed between the casting of adjacent sections of concrete separated by contraction joints

The placing of concrete by pumping in any section of the Works together with any changes in mix proportions shall be subject to the approval of the Employer's Agent.

**PSG 5.5.5.7 Placing concrete underwater**

Add the following to G 5.5.5.7:

Placing of concrete underwater will be permitted only under exceptional circumstances when it is, in the opinion of the Employer's Agent, not practicable to dewater before placing. No concrete shall be placed in flowing water. The methods and equipment for placing concrete under water together with any changes in the mix proportions shall be subject to the approval of the Employer's Agent. During and after concreting underwater, pumping or dewatering operations in the immediate vicinity shall be suspended should there be, in the opinion of the Employer's Agent, any danger that such operations will interfere with the freshly placed concrete before it has gained adequate strength.

**PSG 5.5.7 Construction Joints**

The use of construction joints must be minimized and may only be placed as approved by the Employer's Agent. The contractor must submit a joint construction plan.

At all construction joints in walls a HDPE water stop without a center bulb must be placed as shown on the drawings.

Alternative materials (Hydrophyllic) with similar properties may be proposed but may only be installed after approval of the Employer's Agent.

**PSG 5.5.8 Curing and Protection**

Substitute G 5.5.8 with the following:

As soon as any portion of the concrete being cast has taken on its final set it shall be protected against loss of moisture and short-term surface temperature changes by adequate curing, which curing shall be performed without interruption for a minimum period of 14 days after casting on exposed surfaces or on surfaces where the formwork is removed before the end of the said curing period. Curing shall be accomplished by one or more of the following standard methods of curing as approved by the Employer's Agent for each type of structure, unless otherwise indicated on the Drawings or in these specifications :

- Covering with moisture retaining materials, such as sand or cotton, jute mats or polystyrene.

Covering the concrete with waterproof plastic sheets firmly held and sealed at the edges so as to prevent the escape of moisture shall be employed for concrete receiving a U3 or other special finish, until such time as, in the opinion of the Employer's Agent, the concrete has hardened sufficiently for other methods of curing to be applied without damaging the surface. The materials used to cover the concrete shall generally be such as to ensure adequate heat dissipation.

Liquid curing compounds, applied by spraying only, shall be used only with the prior approval of the Employer's Agent and where other methods are impractical.

Whatever method of curing is adopted, the concrete shall not be stained, marked, contaminated or damaged.

Curing will not be required in galleries or chambers if airtight bulkheads are provided, which in the opinion of the Employer's Agent adequately protect the concrete from loss of moisture. The Contractor shall however ensure that sufficient moisture is present within the area to maintain a high relative humidity. Where absorptive formwork or formwork which, in the opinion of the Employer's Agent, will allow the loss of moisture from the surface of the formed concrete is used these forms shall be kept continuously wet.

After casting, all freshly placed concrete shall be protected from direct exposure to the sun for a period of at least 72 hours or the minimum specified time interval between lifts, whichever is the longer. Adequate protection shall be provided during the critical period between casting and commencing curing.

When at any stage during the curing period the air or water temperature is expected to drop below the minimum expected temperature adopted for establishing the concrete placing temperature in terms of **Particular Specification: PA** the Contractor shall immediately inform the Employer's Agent who shall determine what measures are to be taken to protect the concrete.

When at any stage during the curing period the air or water temperature drops below 10°C the curing period shall be extended at least by the same length of time as that for which the air or water temperature dropped to below 10°C.

The Contractor shall protect all concrete against injury or damage.

#### **PSG 5.5.10 Concrete Surfaces**

Exposed surfaces of concrete not finished against forms shall be brought up to a plane, uniform surface with suitable screed boards. The required surface finish is indicated on the Drawings with the following classifications:

##### **Class U1**

After completion of the placing and compaction of concrete as specified in **Clause PSG 5.5.5** and **PSG 5.5.6**, the top surface shall be screeded and tamped on the surface with the screeding board to ensure that the surface concrete is adequately compacted. The surface shall be left slightly rough at completion.

The finish shall be used as a first step for all other unformed concrete surfaces.

The finish of the concrete surface shall be accurate to Degree of Accuracy I as defined in **SANS 1200 Clause G 6**.

##### **Class U2**

After the concrete has been screeded and has set sufficiently, it shall be floated with a wooden float to produce a non-skid surface free from screed marks and uniform in appearance and texture. Floating may be performed by the use of hand or power driven equipment.

Joints and edges shall be tooled and entrance slabs and steps reeded as required.

The finish of the concrete surface shall be accurate to Degree of Accuracy II as defined in **SANS 1200 Clause G 6**.

##### **Class U3**

After being screeded, the surface shall be lightly wood-floated. It shall be left undisturbed until it has stiffened markedly to prevent an excess of fine materials from being drawn to the surface. At this stage any bleed water and laitance shall be removed from the surface which shall then be steel-floated. Adequate pressure shall be applied to compact the surface to the highest degree possible to flatten the sandy texture of the floated surface and produce a clean uniform surface free from blemishes and trowel marks.

On no account shall neat cement be applied to the surface during trowelling. Where this finish is required for special hydraulic surfaces extreme care shall be taken to avoid an excess of fine materials or moisture on the surface.

The finish of the concrete surface shall be accurate to Degree of Accuracy III as defined in **SANS 1200 Clause G 6**.

Irrespective of the specified degree of accuracy the Contractor shall ensure that no depressions that can collect standing water exist on the finished surface.

#### **Class U4**

The requirements are similar to a U3 finish but the surface shall be accurate to a Degree of Accuracy IV, as defined in **SANS 1200 Clause G 6**.

#### **Class U5 – Brushed Finish**

The concrete surface shall firstly be prepared as a U2 finish and then lightly brushed with a stiff broom to produce a textured finish. The broom used, once approved, shall be kept for this finish only and not used for any other purpose.

#### **Special Surface Finishes**

The floor surface finish of the operating and control rooms shall have a special steel float finish, prepared as a U3 finish, and be treated with a non-metallic surface hardener as specified, applied in accordance with the manufacturer's instructions.

### **PSG 5.5.13 Grouting**

Concrete surfaces in pockets, under bedplates or any other voids in which grouting is required shall first be prepared by scabbling, steel brushing and washing with water to remove all dirt or loose material. The mortar grout shall consist of an approved mixture of cement, sand, water, and admixture, and shall be so rammed into the pockets under each base or bedplate (as applicable) that all voids and pockets are completely filled around the bolt or between the top of the concrete and underside of the metalwork. The exposed surfaces shall be wood-floated to a neat finish at the level indicated on the Drawings or ordered by the Employer's Agent.

### **PSG 5.5.15 Records**

Substitute G 5.5.15 with the following:

The Contractor shall maintain a detailed daily record of all concreting operations on Site and shall submit copies to the Employer's Agent the following morning. These records shall include:

Location of section concreted.

Date of placing.

Start and completion time of concreting.

Rainfall, relative humidity and wet and dry bulb air temperature readings. The humidity and temperature shall be the maximum and minimum readings for the day in question.

The type, number, size, time, location and identification of all samples taken.

The type and results of field testing on samples taken.

### **PSG 5.5.16 Concrete cooling**

The Contractor shall submit to the Employer's Agent for his approval, full details of all methods proposed by him for minimising the rise in the temperature (as specified) of newly placed concrete due to the generated heat of hydration. During adverse weather or when directed by the Employer's Agent, the Contractor shall implement the approved measures and he shall take regular temperature readings of the placed concrete at intervals determined by the Employer's Agent.

The temperature of concrete, at the point of final placement, that is placed to the maximum permitted normal lift heights in sections where the minimum section dimension exceeds 2 000 mm or in such thinner sections as may be shown on the Drawings or ordered by the Employer's Agent, shall not exceed the lesser of the following temperatures:

$$T = 40 - 0,1 \times T_{\max} - 0,1 \times B$$

or

$$T = 18 + 0,67 \times T_{\min} - 0,06 \times B$$

where

T = maximum permitted placing temperature in °C.

T<sub>max</sub> = maximum expected average day temperature in °C of the surface of the concrete during the first 7 days after placement of the particular concrete.

T<sub>min</sub> = minimum expected temperature in °C of the surface of the concrete during the first 14 days after placement of the particular concrete.

B = total equivalent cementitious content in kg/m<sup>3</sup> of concrete where the equivalent cementitious contents of the various binders are accepted to be as follows:

Cement	-	1,0kg/kg
GBS	-	0,65kg/kg
FA	-	0,40kg/kg

In addition to the foregoing criteria, the temperature of concrete, at the point of final placement, that is placed in lifts of reduced thickness in the proximity of rock foundations, cold concrete construction joints or concrete that is otherwise more than 14 days old and also where the minimum horizontal section dimension exceeds 2 000 mm or in such thinner sections as may be shown on the Drawings or ordered by the Employer's Agent, shall not exceed the following:

$$T = 15,5 + 1,4 \times T_{\text{ave}} - 0,6 \times T_{\max} - 0,08 \times B$$

where

T = maximum permitted placing temperature in °C.

T<sub>ave</sub> = average surface temperature of the underlying rock or concrete during the preceding 2 days.

T<sub>max</sub> = maximum expected average day temperature in °C of the surface of the concrete during the first 7 days after placement of the particular concrete.

B = total equivalent cementitious content in kg/m<sup>3</sup> of concrete as defined hereinbefore.

In order to comply with the aforementioned temperature requirements the Contractor shall take some or all of the following precautions as may be approved by the Employer's Agent:

- Precool the mixing water or replace this with ice.
- Shade aggregate stockpiles.
- Precool the aggregates.
- Cool the freshly mixed concrete with liquified nitrogen gas.

Should the Contractor elect to use ice in the mixing water or to replace the latter with ice entirely, the mixing times shall be extended as approved by the Employer's Agent to ensure complete melting and dispersion before mixing is completed. All measures adopted by the Contractor shall be subject to the prior approval of the Employer's Agent.

During a particular concreting operation or within a particular concrete lift the temperatures of the ingredients used in the concrete mixes shall only be changed to the extent necessary to maintain a constant placing temperature. Regular temperature readings of the freshly placed concrete and of

the wet-bulb air temperature shall be made by the Contractor at intervals to be approved by the Employer's Agent and copies of the records of these temperature readings shall be delivered to the Employer's Agent on a form to be approved by the Employer's Agent.

All surfaces against which fresh concrete is to be placed, irrespective of temperature, shall be kept damp in order to prevent excessive absorption of water from the fresh concrete.

**PSG 5.5.17 Protective measures**

During periods when the ambient temperature could reach 30°C or more, the Contractor shall erect suitable shading for all metal surfaces other than reinforcing steel which come into contact with the concrete or its constituent materials.

When necessary, the Contractor shall erect windbreaks or mist spraying system to prevent the initial rapid drying out of the concrete prior to commencing curing procedures.

**PSG 5.5.18 Preparation of Concrete and Rock Surfaces**

The following paragraphs specify the requirements for preparing construction joints in concrete and rock surfaces to ensure a firm bond with the newly placed concrete. The specified preparation of concrete surfaces shall be carried out up to 20 mm from the edges of the concrete surface to prevent damage to the concrete edges, also taking particular care to ensure that the surfaces are thoroughly cleaned in the vicinity of reinforcing, waterstops, steel pipework and other embedded components. When chipping is used, care must be taken not to induce cracking in the remaining aggregate. No heavy breakers will be allowed to execute the breaking.

a) Concrete less than 24 hours old:

The surface shall be prepared using an air-water jet to remove all laitance and to expose clean, sound coarse aggregate. Care shall be taken not to undercut the edges of larger aggregate. The air pressure used in the jet shall be 700 kPa plus or minus 5 kPa and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. On completion, the surface shall be washed to remove all loose particles. The surface shall again be washed just prior to placing the succeeding lift.

Water should be removed immediately after water jetting and polystyrene placed to prevent temperature loss.

b) Concrete more than 24 hours but less than 3 days old

Cleaning shall be carried out using a high pressure water jet with a pressure of not less than 20 MPa. Only the surface laitance shall be removed to expose clean, sound coarse aggregate and no undercutting of the larger aggregate particles shall be permitted. All loose debris shall be washed from the surface which shall be repeated just prior to placing the next lift.

c) Concrete more than 3 days old but less than 14 days old

Sandblasting, scraping or chipping shall be carried out until all accumulated laitance, coatings, stains, debris and other foreign matter have been removed. The surface of the concrete shall then be washed to remove all loose material and this shall be repeated just prior to placing the next lift.

d) Rock surfaces and concrete more than 14 days old:

Whenever fresh concrete must be cast upon a rock foundation or must be bonded to underlying concrete at a cold construction joint or to underlying concrete that is more than 14 days old the approval of the Employer's Agent shall first be obtained. Unless otherwise approved by the Employer's Agent the heights of the lifts shall be reduced temporarily as shown on the Drawings. The normal height of lift can usually be reverted to after concrete has been cast to a height equal to at



least one normal lift above the old concrete or the highest point of the rock foundation. The Contractor shall prepare for the approval of the Employer's Agent a programme of proposed time intervals between lifts to be adopted for the lifts of reduced height and the subsequent lifts of normal height. The placing temperatures for the concrete in the various lifts shall be as specified in the relevant clauses of this specification.

The surfaces of concrete construction joints shall be prepared as specified in the foregoing paragraph c).

Excavated rock surfaces accepted and approved in terms of **SANS 1200 PS D: EARTHWORKS**, shall be prepared by raking out all unsuitable material in any crevices or seams and then cleaned with air/water jets. Features with an average width of less than 25 mm shall be filled with cement grout having a water : cement ratio of not more than 0,55. Seams and crevices between 25 mm and 75 mm wide shall be filled with cement mortar rodded into position with steel bars. The mortar shall comprise sand and cement in the same proportions as used for a grade 25 MPa concrete. Wider features shall be filled with Class 25/19 or Class 25/38 concrete, as appropriate.

The surfaces of contraction joints shall be cleaned thoroughly of accretions of concrete or other foreign matter by scraping, or other means satisfactory to the Employer's Agent before any fresh concrete is placed against such a joint. Where positive separation of the concrete faces is required, bitumen painting or other approved bond breaker or approved filler materials are to be incorporated where shown on the Drawings or ordered by the Employer's Agent.

The washing operations specified above shall be continued until all cloudiness in the wash water is removed.

Particular care shall be taken in removing water and debris from the surface of a construction joint to ensure there is no damage or staining of exposed concrete faces and there is no pollution of natural watercourses.

The rock or construction joint surface shall be kept continuously wet for a period of 24 hours prior to placing concrete. All free water shall be removed from the surface before placement of additional concrete (SSD Saturated surface dry). Immediately prior to placing the new concrete, the joint or rock surface shall be covered with a 20 mm layer of mortar. The mortar shall comprise sand and cement in the same proportions as used for the concrete and shall be of a consistency such that it is sufficiently plastic to be easily placed. Concrete shall be placed immediately upon the fresh mortar. If in the opinion of the Employer's Agent the local presence of persistent seepage water may weaken the composition of the mortar, a 19 mm concrete shall be used in lieu of the mortar as a bedding layer with the same grade as that of the concrete. Any mortar which becomes dry or which starts to set before being covered with concrete shall be removed, the area cleaned and fresh mortar placed.

#### **PSG 5.5.19 Preparation of Concrete Surfaces to Receive Second Stage Concrete**

The surfaces of concrete to receive second stage concrete shall be prepared by means of scraping, sandblasting, washing or other means until clean sound aggregates are exposed over the entire surface. This surface preparation shall be carried out prior to the installation of built-in parts as required for the hydraulic steelwork. Lift joints in second stage concrete shall be prepared as specified in **Clause PSG 5.5.19**.

The purpose of surface preparation of existing hardened concrete is to ensure proper bonding between the old and new concrete so that the total concrete mass will act as a unit (monolithic) once the new concrete reaches full strength and to ensure the im-permeability of the joint.

A high-quality joint will be ensured which in both cases are water-tight and have a proper bond by firstly a low slump concrete of the last layer of the previously placed concrete. Concrete with high slump values tend to segregate, bleed and produce more laitance that becomes difficult to remove.

Secondly a quality joint will be ensured by quality concrete as well as the quality of the surface preparation. A coarse surface does not necessary ensures a good joint. (Must be a sandpaper finish) Footprints in the concrete, aggregate that sticks out only makes the preparation work more difficult

because laitance can't be removed properly. Thus during the concreting the surface should be vibrated to a level surface, all expose aggregate should be vibrated into the concrete.

A lot of studies done by the "Bureau of Reclamation" showed that sandblasting produces the best surface following by water jetting. Sand blasting is not always possible due to safety concerns therefore water jetting should be used. The timing is crucial when using water jetting. Too early and the aggregate can be dislodge, too late and the laitance can't be removed.

A quote from the "Guide to Concrete Repairs"

Impact concrete removal techniques, such as jackhammering for large jobs and bush hammering for smaller areas, have been used for many years. These removal procedures are quick and economical, but it should be kept in mind that the costs of subsequent removal of microfracture surfaces resulting from these techniques must be included when comparing the costs of high-pressure water blasting. The larger jackhammers remove concrete at a high rate but are more likely to damage the surrounding sound concrete. The larger jackhammers can impact and loosen the bond of concrete to reinforcing steel for quite some distance away from the point of impact. Pointed hammer bits, which are more likely to break the concrete cleanly rather than to pulverize it, should be used to reduce the occurrence of surface micro-fracturing.

### **PSG 5.5.20 Remedial Treatment of Surface Defects**

#### **General**

Immediately after the formwork has been removed, the Contractor shall examine the concrete surfaces and report any defects to the Employer's Agent. All repairs of such defects shall be performed by skilled workmen only, using methods approved by the Employer's Agent. Under no circumstances shall any repairs be undertaken without the prior authorisation of the Employer's Agent.

After examination of the quality and strength of any defective work, the Employer's Agent may either authorise remedial treatment or order the demolition and reconstruction of the whole of the defective work. All remedial treatment and demolition and reconstruction shall be for the Contractor account.

Remedial treatment of whatever nature shall be carried out immediately after removal of the formwork.

#### **Surface Blemishes**

Any minor surface blemishes shall be repaired to the satisfaction of the Employer's Agent immediately after removal of the formwork. Remedial measures may include the following:

- Holes in concrete of such size as will accept concrete, shall be filled with the same class of concrete as the damaged concrete. Larger size aggregates shall be screened out of the concrete used for filling of holes.
- Holes left by formwork supports (tie holes) shall be thoroughly cleaned out to remove all loose material and the sides shall be roughened, if necessary, to ensure a satisfactory bond. They shall then be filled with dry pack mortar. Where a F4 surface finish has been specified, an epoxy mortar to be approved by the Employer's Agent shall be used. The use of commercial repair mortars shall only be used with the prior approval of the Employer's Agent.
- Small areas that show honeycombing or other defects such as isolated holes formed by air and water bubbles, shall be filled with mortar having a water : cement and cement : sand ratio equal to that of the concrete being repaired.
- Abrupt and gradual irregularities may be rubbed down with carborundum and water after the concrete has been fully cured.

- Small defects and minor honeycombing shall be chipped out perpendicular to the face of the concrete to a depth of at least 25 mm and filled with a commercial repair mortar, such as Sika Rep or equal, applied according to the manufacturer's instructions.

All filling shall be bonded tightly to the surfaces of the hole and shall be sound and free from shrinkage cracks and hollow areas after the fillings have been cured and dried.

If a concrete finish does not comply with the specified requirements, then such a surface shall be rubbed and polished as described below until it does comply.

### **Larger Defects**

For the repair of larger and more extensive defects, special methods and techniques such as the pneumatic application of mortar, pressure grouting or other methods of repair shall be used as agreed and approved by the Employer's Agent. Other methods may include, but each method must be submitted to the Employer's Agent for review and approval:

#### **Removing the whole pour and re-concreting.**

Cutting out to a depth of 25 mm with a diamond saw to give a regular edge to the repair. Further chipping to form a hole with dovetail shape to sound concrete, or to a depth of 75 mm behind the reinforcing steel shall be carried out. Stainless steel mesh reinforcing shall be sprung into the dovetail. The void shall be refilled with a repair mortar, such as Sika Rep or equal, applied according to the manufacturer's instructions.

If a concrete finish does not comply with the specified requirements, then such a surface shall be rubbed and polished as described below until it does comply.

Particular care shall be exercised to ensure that the colour of the repair work shall match the colour of the surrounding concrete. No cement washing or plastering shall be carried out except on the written approval of the Employer's Agent.

#### **Rubbing and Polishing of Formed Surfaces**

Before commencement of rubbing and polishing, all other repair work shall be completed. The surface shall be soaked with water for at least one hour. Initially the surface shall be rubbed with a medium coarse carborundum stone by using small quantities of mortar on the surface in the proportion as specified above. Polishing shall continue until all shutter marks, protrusions and other marks are removed and a uniform surface is obtained. The paste resulting from the polishing shall be left on the surface. Final polishing shall be done with a fine carborundum stone and water. This polishing shall be continued until a smooth, uniform texture and uniform colour are obtained on the whole surface.

Thereafter the surface shall be washed with water and a brush to remove all excess paste and powder.

#### **Preparation for Remedial Work**

The Contractor shall thoroughly clean any hole or defective area that is to be filled and where the surface has been damaged the Contractor shall break out any loose, broken or cracked concrete or aggregate.

Where the remedial work is to be carried out using dry-pack mortar, the concrete surrounding the hole shall be thoroughly soaked after which the surface shall be dried so as to leave a small amount of free water on the surface. The surface shall then be dusted lightly with cement by means of a small dry brush until the whole surface that will come into contact with the dry-pack mortar has been covered and darkened by the absorption of the free water by the cement. Any dry cement in the hole shall be removed.

### **Curing of repaired surfaces**

Curing of repaired surfaces shall be carried out for the durations and in the manners prescribed by **Clause PSG 5.5.8** of this specification or in such a manner and for such periods as the Employer's Agent may direct from time to time.

### **Protection of surfaces**

The Contractor shall ensure that all surfaces (apart from F1 and U1) are protected against rust marks, spilling of concrete, stains and all other damages.

### **Dry-pack Mortar**

Dry-pack mortar for filling holes and repairing surfaces shall be made from one part by weight of cement and three parts aggregate passing a 1 mm sieve. The colour of the mortar shall match that of the surrounding concrete. The mortar shall be mixed with only sufficient water to make the materials stick together when being moulded in the hands.

The dry-pack material shall be placed and packed in layers having a thickness not greater than 15 mm. The compaction shall be carried out by use of a hardwood block and hammer and shall extend over the full area of the layer, particular care being taken to compact the dry-pack against the sides of the hole. After compaction of the surface of each layer shall be scratched before further loose material is added. Holes shall not be over filled and the surface shall be finished by laying a hardwood block against the dry-pack fill and striking the block several times. Steel finishing tools shall not be used and water shall not be added to facilitate finishing.

### **PSG 5.5.21 No-fines concrete**

No-fines concrete shall comprise approved cement or cementitious material and 19 mm aggregate. The concrete shall have a water : cement ratio of not more than 0,45 and an aggregate : cement ratio of between 10 and 5 as approved by the Employer's Agent. The actual aggregate : cement ratio shall be determined by the Contractor from trial mixes. The mix shall be so designed that cement and water do not settle out or block the openings in the drain pipes while ensuring sufficient paste to fully coat the aggregate particles and provide the minimum strength with a freely draining concrete. The strength shall be determined from cubes manufactured, cured and tested in accordance with SANS 5863. The minimum strength at 14 days shall be 4,5 MPa.

The construction of no-fines concrete shall commence at the lowest point of the foundations. Construction joints shall coincide with the designated joints in any overlying slab. Shuttered construction joints shall be cut back to a porous surface should the struck surface texture not be porous enough in the opinion of the Employer's Agent.

The coarse aggregate for no-fines concrete shall be mixed with sufficient water to be properly wetted before the cement and the remaining water are added. The concrete shall be placed within 20 minutes of being mixed. The methods utilised for transport and placing shall minimise any segregation of the mix.

No-fines concrete shall be compacted by rodding and screeding to fill all spaces but no tamping, ramming or vibration shall be used which may cause clogging of the openings in pipes embedded in the concrete. The Contractor shall ensure that any underlying filters do not become clogged with cement paste and the top of the concrete surface is entirely porous.

No-fines concrete shall be cured by continuous wetting or spraying for a period of 10 days.

The Contractor shall protect the no-fines concrete layers from becoming damaged or clogged prior to construction of the overlying layers. Any damaged or clogged drains shall be reinstated or replaced by the Contractor at his own cost.

**PSG 5.5.22 Flow concrete**

Flow concrete is a self-compacting concrete which has a slump of at least 250 mm and which is self-levelling under horizontal gravity flow without the occurrence of any segregation. The mixture shall be designed to prevent bleeding of the concrete. The purpose of using flow concrete is to ensure that the concrete will fill the diversion opening right up to the roof soffit after placing of the concrete to roof level, while at the same time being well compacted. It is also used to close off the compensation water pipe.

The use of an appropriate superplasticiser reduces the cement content and water demand of the mix relative to that of a conventional mix with an equivalent 28-day strength. Consequently, both drying and heat induced shrinkage and cracking is minimised.

For this reason, only a superplasticiser requiring a low water : cement ratio and a low water content in order to produce concrete with a maximum permissible 28-day strength of 20 MPa will be acceptable.

Flow shall be measured in accordance with BS 1881 : Part 105. Concrete is regarded as flowing when the diameter of spread, measured on a flow table exceeds 510 mm.

The flow concrete must be designed in such manner that it can be pumped to the point of placement without segregation and/or blockages of the pumping line.

**PSG 7 TESTS**

**PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING**

**PSG 7.1.1 Facilities**

Add the following to G 7.1.1:

All cementitious materials and reinforcement deliveries not carrying the mark of the standards institution shall be accompanied by test certificates from the appropriate standards institution confirming compliance with the relevant specifications. In the case of cementitious materials the deliveries shall be accompanied by a certificate from the manufacturer stating the date of manufacture. In the case of steel that is subjected to consignment inspection by the SABS it shall be accompanied by a certificate issued by the SABS confirming compliance with the relevant specifications.

**PSG 7.2 TESTING**

**PSG 7.2.1 General**

Add the following to G 7.2.1:

All testing described in this specification shall be carried out by the Contractor in accordance with the methods referred to in this specification and to confirm compliance with all the specified requirements. Copies of the results of all tests carried out by the Contractor shall be submitted to the Employer's Agent immediately after the testing.

The testing and the management of the lab should follow SANS 17025: General requirements for the competence of testing and calibration laboratories

The Employer's Agent may take such samples, prepare such specimens and conduct such tests as and when he requires for quality monitoring.

#### **PSG 7.2.2 Site testing**

Add the following to G 7.2.2:

##### **a) Cementitious Materials**

No tests on the cementitious materials need be conducted on Site, but all cementitious materials shall have been certified by the SABS.

##### **b) Coarse Aggregates**

Coarse aggregates shall be tested daily by the Contractor as part of his quality and process control to ensure compliance with the requirements of **Clause G 3.4**. Sampling and testing shall be carried out in accordance with SANS 195 and 1083 respectively.

The Contractor shall also provide such facilities as may be required by the Employer's Agent for procuring representative samples for quality monitoring tests.

No coarse aggregates will be approved for use in the Works until satisfactory 28-day compression tests have been made by the Contractor on concrete cubes using the aggregates.

Samples for testing shall be taken from the aggregate stockpiles in accordance with and in lot sizes as specified in SANS 1083 unless otherwise approved by the Employer's Agent.

The percentage of free moisture present shall be checked hourly at the batching plant whenever concreting is in progress.

##### **c) Fine Aggregates**

Fine aggregates shall be tested daily by the Contractor as part of his quality and process control to ensure compliance with the requirements of **Clause G 3.4**. Sampling and testing shall be carried out in accordance with SANS 195 and 1083 respectively.

The Contractor shall also provide such facilities as may be required by the Employer's Agent for procuring representative samples for quality monitoring tests.

Samples for testing shall be taken from aggregate stockpiles in accordance with and in lot sizes as specified in SANS 1083 unless otherwise approved by the Employer's Agent.

During concreting operations the fine aggregate used at the batching plant shall be sampled and tested at least hourly for moisture content in order to maintain a constant water : cement ratio in the concrete mixes.

#### **PSG 7.2.3 Laboratory Testing**

##### **a) Registers and Reporting**

A register of samples shall be kept by the Laboratory Manager clearly indicating the sample no., location, material description and name of sampler for concrete and aggregates.

A daily register shall be kept in which the following information is entered in respect of the concrete cubes made that day.

##### **i) Mix proportions**

- ii) Class of concrete
- iii) Workability
- iv) Where sampled
- v) Where placed (e.g. block no., reduced, level, chainage, etc.)
- vi) Weather conditions at day of placing (e.g. cloudy sky, windy, hot or cool, temperature, etc.)
- vii) Concrete temperature

A weekly materials report shall be prepared which shall include all relevant information on materials and placed concrete. This report shall be submitted to the Employer's Agent no later than 15:00 on the Monday immediately following the reporting period.

b) Water

Water shall be tested on a monthly basis by an approved laboratory to ensure compliance with the requirements of **Clause G 3.3**.

**PSG 7.2.3 Early-Strength Testing**

Substitute G 7.2.3 with the following:

The Contractor shall as part of his quality and process control carry out tests on the concrete at regular intervals to ensure compliance with this specification. The frequency at which the tests listed below are carried out by the Contractor during a concreting shift shall be agreed between the Contractor and Employer's Agent, except for the frequency of compression strength tests which shall be carried out as described hereinafter.

The frequency of sampling and testing shall be as follows:

- a) Initial Concrete (at start of production)
  - i) For testing of 28/90/180 day strength  
  
3 x 150 mm cubes from one mix for every 50 m<sup>3</sup> concrete placed with a maximum of 12 cubes per day.
  - ii) For testing of 7 day strength  
  
3 x 150 mm cubes from the same mix from which the 28 day strength cubes are taken for every 50 m<sup>3</sup> concrete placed.
- b) Production Concrete (defined as concrete placed when the batching plant is in full operation)
  - i) For testing of 28 day strength  
  
150 x 150 mm cubes from 40 different mixes at 3 cubes per mix plus 3 x 300 mm cubes (for unreinforced structural concrete only) taken at 1 cube from every 10<sup>th</sup> mix.
  - ii) For testing of 7 day strength  
  
3 x 150 mm from each mix which is sample for 28 days strengths.  
  
The cubes at the start of production stage shall be taken within the shortest possible period.
- c) First three months after start of production
  - i) For testing of 28 day strength

6 x 150 mm cubes from 6 different mixes per day taken at near equal time intervals over that day plus 1 x 300 mm cube (unreinforced structural concrete only) every second day. The first truck and last truck should be sampled and the rest spread over the casting period.

d) Quality control for remainder of concrete placing programme

i) For testing of 28 day strength

3 x 150 mm cubes per day taken from 3 different mixes at near equal intervals for a given day plus 1 x 300 mm cube (unreinforced structural concrete only) every week.

The above procedures shall be repeated for each class of concrete.

All samples taken, test specimens prepared and tests conducted by the Contractor may be witnessed by the Employer's Agent if so desired and vice versa.

Sampling of freshly-mixed concrete shall be carried out in accordance with SANS 5861 at the nearest practicable point prior to final placement.

Test cubes shall be cured in a thermostatically controlled curing tank in accordance with SANS 5861-3.

Whereas the criteria for concrete strength in the specification are based on 150 mm cubes compression tested at the age of 28 days only, additional cubes shall be made each time as specified hereinbefore for early-strength testing by the Contractor. Correlation between early-strength test results and expected strength at 28 days shall be based on sufficient evidence obtained through continuous testing at the different ages.

Early-strength test results (i.e. less than 28 days) shall not be used for assessment of strength in terms of **Clause G 7.3**.

For 90/180 day testing the Contractor may make use of the maturity concept (accelerating curing), this however need to be approved by the Employer's Agent. It allows the Contractor to test the cubes at an early age but will represent for example 180 days. The cubes are cured in concrete bath at higher temperatures, this accelerate the hydration process. This can be done but requires proper control.

### **PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH OF CONCRETE**

Add the following to 7.3:

Any particular class of concrete shall be deemed to have failed to meet the requirements of this specification if :

- a) The strength does not satisfy the criteria of **Clause G 7.3.2**.
- b) The water : cement ratio is higher than the approved ratio.
- c) The total mass of cementitious materials is below the approved mass or exceeds the approved mass by more than 4 % by mass of cementitious materials.
- d) The mass of extenders used to replace cement departs by more than 2 % by mass of extender from the approved mass.
- e) The compaction factor is less than the specified value.



- f) The placing temperature of the concrete is above the required placing temperature.
- g) Curing has not been performed in terms of the specified requirements.
- h) The concrete has not been compacted to the specified requirements or bleeding, segregation or honeycombing has occurred.

Under such circumstances, the Employer's Agent shall determine the extent of the affected section of the Works and the Contractor shall immediately and before proceeding with further concreting operations submit to the Employer's Agent for approval of detailed proposals for ensuring that future concrete will comply with the specifications and also for rectifying the defects, which shall include extended curing or replacement or strengthening of concrete.

If in his opinion it is deemed necessary the Employer's Agent shall instruct the Contractor or shall himself conduct all or any of the examinations set out in **Clause G 7.3.3** before approval is given for the proposed methods of rectifying the particular defects.

## **PSG 8 MEASUREMENT AND PAYMENT**

### **PSG 8.1 MEASUREMENT AND RATES**

Substitute G 8.1 with the following:

#### **PSG 8.1.1 Formwork**

The unit rate shall cover the cost of all parts of formwork in contact with the concrete, including forming fillets or splays up to 25 mm x 25 mm, and the necessary bearers, struts, safety platforms and other supports plus the labour and plant necessary to erect and strike such formwork.

- a) Formwork, other than formwork covered by **Clause PSG 8.1.1 b)** will be measured as the net area of the face of the concrete to be supported during the deposition of concrete. No deduction will be made for fillets and splays of size up to 50 mm x 50 mm or for openings of diameter up to 0,7 m or of an area up to 0,5 m<sup>2</sup>.
- b) Formwork in continuous lengths of narrow widths and of fillers or splays over 25 mm x 25 mm will be measured by length, the width or range of widths being stated in the Schedule.
- c) Separate items will be scheduled for each class of finish required on the formed concrete.
- d) Separate items will be scheduled for each inclination of formwork on the following basis :

Description	Angle of inclination from vertical
Horizontal	Exceeding 85° and not exceeding 95°
Sloping	Exceeding 10° and not exceeding 85°
Battered	Not exceeding 10°
Vertical	0°

- e) Separate items will be scheduled for each inclination of each type of structural element, such as walls and beams, for different prop heights for beams and slabs and for formwork to curved (single and double curvature), curved in plan only, arched, domical, specially moulded and other types of work.

- f) Separate items will be scheduled for depths of openings, measured perpendicular to the surface, required in the formed concrete, as follows :
- |               |                               |
|---------------|-------------------------------|
| not exceeding | 0,5 m                         |
| exceeding     | 0,5 m but not exceeding 1,0 m |
| exceeding     | 1,0 m but not exceeding 1,5 m |
| exceeding     | 1,5 m but not exceeding 2,0 m |
| exceeding     | 2,0 m                         |
- g) Separate items will be scheduled for voids formed in the concrete as follows :
- large voids : exceeding 0,1 m<sup>2</sup> and not exceeding 0,5 m<sup>2</sup> or exceeding 0,35 m diameter and not exceeding 0,7 m diameter
- small voids : not exceeding 0,1 m<sup>2</sup> or not exceeding 0,35 m diameter
- h) Where a special finish is required and scheduled, payment will become due when the finish has been achieved as specified.

#### PSG 8.1.2 Reinforcement

Steel for normal reinforced concrete will be measured net by mass of all bars, including supporting steel detailed on the reinforcing schedules. The mass will be computed from the nominal bar size and the nominal mass per unit length. No allowance will be made for cutting, waste, spacer devices (materials other than steel bars) or binding wire. The unit rates shall cover the cost of supply, cutting, bending and the provision of all spacer devices as well as the cost of tests in terms of SANS 920.

Steel reinforcement for precast concrete units will not be measured unless so scheduled.

Welded mesh will be measured by area as shown on the drawings, no allowance being made for cutting, waste, caps or deductions for end cover. The areas measured will be those of the concrete floor or slab reinforced by means of mesh. In the case of continuous units partly reinforced by mesh, the area will be computed from the outside dimensions of the area covered by mesh regardless of whether additional reinforcing steel is present in the same area.

Steel off-cuts resulting from the cutting and bending of reinforcement in accordance with the bending schedule shall be deemed to be the property of the Contractor.

Separate items will be scheduled for :

- a) each size and type of steel bars
- b) type and mass per square meter of welded mesh
- c) each steel section where rails and other steel sections are used.

#### PSG 8.1.3 Concrete

Concrete will be measured net to the dimensions shown on the drawings or to the dimensions cast, whichever are the smaller. Structural elements that are undersized will be measured for payment only if they are acceptable to the Employer's Agent.

No allowance will be made for concrete required to make up overbreak in excavation unless expressly ordered by the Employer's Agent to replace unsuitable material.

Subfoundation carpets and blinding layers will be measured to the plan size of the concrete structure resting on the carpet. Where concrete is scheduled by volume it will be measured on the nominal thickness indicated on the Drawings.

Separate items will be scheduled for each class of concrete and for each unit of the Works or each element of a structure where these could materially influence the pricing of the work and where the cost of depositing concrete is affected by its position in the Works or by the conditions of placing such as :

- slabs that are sloping, conical or horizontal and those of different thicknesses
- concrete deposited under water
- small quantities each less than 0,5 m<sup>3</sup> of formed concrete.

The unit rates shall cover the cost of the design of the mix, the provision of materials, batching, mixing, testing, joint and surface preparation, transport, placing, compacting, the forming of stop-ends and unforeseen joints, striking off or levelling as applicable, curing and repairing as necessary.

Floor slabs where placed on sub-foundation carpets or directly on the prepared ground surface will be measured to the net thickness dimensioned on the Drawings. Concrete in a column supporting a reinforced concrete beam or slab structure will be measured between the top surface of the foundation, beam or slab on which the foot of the column is standing and the underside of the beam or slab supported by the column.

No deduction or addition will be made for nosings, bolt holes, chamfers or splays of size up to 50 mm x 50 mm, grooves or chases not exceeding 0,015 m<sup>3</sup> each in volume, or holding-down bolts, rails, steel sections and reinforcement cast in concrete.

**PSG 8.2 SCHEDULED FORMWORK ITEMS**

**PSG 8.2.1 Class F1 ..... Unit: m<sup>2</sup>**

The surfaces to be so formed will be identified in the schedule.

**PSG 8.2.2 Class F2 ..... Unit: m<sup>2</sup>**

The surfaces to be so formed will be identified in the schedule.

**PSG 8.2.3 Class F3 ..... Unit: m<sup>2</sup>**

The surfaces to be so formed will be identified in the schedule.

**PSG 8.2.4 Class F4 ..... Unit: m<sup>2</sup>**

The surface to be so formed will be identified in the schedule.

**PSG 8.2.5 Narrow Widths (up to ...mm wide) ..... Unit: m**

The range of widths if up to 300 mm, or width and depth in the case of grooves or chases, will be stated.

**PSG 8.2.6 Box Out Holes/Form Voids. Items will be scheduled as set out below :**

**a) Small, circular, of diameter up to and including 0,35 m**

		<b>Over and</b>	<b>up to and including</b>	
	1)	0m	0,5 m deep .....	Unit: No
	2)	0,5 m	1,0 m deep .....	Unit: No
	3)	1,0 m	1,5 m deep .....	Unit: No
	4)	1,5 m	2,0 m deep .....	Unit: No
	5)	2,0 m deep .....		Unit: No
<b>b)</b>	<b>Small, other than circular, of are up to and including 0,1 m<sup>2</sup></b>			
		<b>Over and</b>	<b>up to and including</b>	
	1)	0m	0,5 m deep .....	Unit: No
	2)	0,5 m	1,0 m deep .....	Unit: No
	3)	1,0 m	1,5 m deep .....	Unit: No
	4)	1,5 m	2,0 m deep .....	Unit: No
	5)	2,0 m deep .....		Unit: No
<b>c)</b>	<b>Large, circular, of diameter over 0,35 m up to and including 0,7 m</b>			
		<b>Over and</b>	<b>up to and including</b>	
	1)	0m	0,5 m deep .....	Unit: No
	2)	0,5 m	1,0 m deep .....	Unit: No
	3)	1,0 m	1,5 m deep .....	Unit: No
	4)	1,5 m	2,0 m deep .....	Unit: No
	5)	2,0 m deep .....		Unit: No
<b>d)</b>	<b>Large, other than circular, of area over 0,1 m<sup>2</sup> and up and including to 0,5 m<sup>2</sup></b>			
		<b>Over and</b>	<b>up to and including</b>	
	1)	0m	0,5 m deep .....	Unit: No
	2)	0,5 m	1,0 m deep .....	Unit: No
	3)	1,0 m	1,5 m deep .....	Unit: No
	4)	1,5 m	2,0 m deep .....	Unit: No
	5)	2,0 m deep .....		Unit: No

**PSG 8.3 SCHEDULED REINFORCEMENT ITEMS**

**PSG 8.3.1 Steel Bars**

**PSG 8.3.1.1 Mild steel .....** Unit: t

**PSG 8.3.1.2 High-tensile steel .....** Unit: t

**PSG 8.3.2 High-Tensile Welded Mesh**

a) Type reference 193 in ... standards sheets ..... m<sup>2</sup>

b) Type reference 193 in ... non-standard sheets ..... m<sup>2</sup>

c) Type reference 395 in ... standard sheets ..... m<sup>2</sup>

**PSG 8.4 SCHEDULED CONCRETE ITEMS**

**PSG 8.4.1 Prescribed Mix Concrete .....** Unit: m<sup>3</sup>

The proportions and the positions or elements in the Works will be stated.

**PSG 8.4.2 Blinding Layer in 20MPa/40mm concrete 75mm minimum thickness .....** Unit: m<sup>2</sup>

**PSG 8.4.3 Strength Concrete, Grade**

**PSG 8.4.3.1 Secondary Concrete**

	Strength concrete: .....	Unit: m <sup>3</sup>
PSG 8.4.3.2	No-fines Concrete	
	Strength concrete: .....	Unit: m <sup>3</sup>
PSG 8.4.3.3	Flow Concrete	
	Strength concrete: .....	Unit: m <sup>3</sup>
PSG 8.4.4	Unformed Surface Finishes	
	a) Wood-floated finish .....	Unit: m <sup>2</sup>
	b) Steel-floated finish .....	Unit: m <sup>2</sup>
PSG 8.5	Joints .....	Unit: m

Separate items will be scheduled for different types and sizes of joints and involving different types, sizes, and qualities of waterstops, soft board, sealers.

The unit rate shall cover the cost of all materials and labour for the construction of each joint as specified in **Particular Specification: PF** or shown on the Drawings, including the cost of formwork, preparation of surfaces, protection, jointing, intersection pieces, testing and making good.

PSG 8.5.1	Waterstops.....	Unit : m
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Distinction shall be made between different types of material, type and sizes of waterstops.

The rate shall cover the cost of supply, installation, jointing and intersection pieces, as well as the additional measures required during concreting.

PF 8.5.2	Protection.....	Unit : m
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The rate shall cover the cost of installation and removal of the protection to the waterstops exposed in the diversion system waterway.

PF 8.5.3	Joint sealants.....	Unit : m
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Distinction shall be made between different sizes and types of grooves to be sealed. The rate shall cover the cost of supplying, making good of damaged groove edges, back up where required, bond breaker, primer, joint sealant and the finishing off of the sealed joint.

PF 8.5.4	Bearings.....	Unit : No or m
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Distinction shall be made between different types of bearings. The rate shall cover the cost of supply, seating in a bedding of sand : epoxy resin mortar and the filling of spaces around the bearing required for casting the superstructure and the cleaning out of the spaces.

## PSG 8.7 GROUTING OF DAM FOUNDATIONS

The grouting of dam foundations work shall consist of flushing grout holes, making grout connections, supplying, mixing and injecting grout into holes, disposing of waste water and grout, cleaning up of the areas upon completion of the work and all such other operations as are incidental to grouting. See **Particular Specification PI: Grouting of Dam Foundations**.

**PSG 8.7.1 SCHEDULED ITEMS**

PSG 8.7.1.1 Grout Connections to Drilled Holes ..... Unit : No

The number of connections to drilled holes for grouting purposes shall be measured. Grout connections shall be measured once only for each stage or section or hole unless the Employer's Agent orders the grouting equipment to be removed and subsequently set up again.

PSG 8.7.1.2 Grouting

Payment for grouting shall be measured by the length of hole or stage in which grout was injected. The rates for payment shall include for mixing of the grout, keeping of grout records, flushing of holes to remove partially set grout, for cleaning operations and any caulking required. The rate shall include for removing any standpipes and casings as specified in **Particular Specification: PI 5.3.1(I)**.

Distinction between standard grouting procedures and specialised grouting procedures as specified in **Clauses PI 5.3** and **Particular Specification: PI 5.4** shall be made as described hereinafter.

a) Standard Grouting ..... Unit : m or No of stages

No distinction between curtain grouting and blanket grouting and between downstage and upstage grouting shall be made.

Separate items shall be scheduled for grouting in confined spaces.

The grouting materials shall be measured for payment under **Particular Specification: PI 8.2.3**.

b) Tube-a-Manchette (TAM) Grouting Method

(i) Length of TAM Installed ..... Unit : m or No of stages

The length of TAM installed for various scheduled sizes shall be measured. The rate for payment shall include for the sleeve grouting as specified in **Particular Specification: PI 5.4.2**.

The grouting materials used for sleeve grouting shall be measured for payment under **Particular Specification: PI 8.2.3**.

(ii) TAM grouting ..... Unit : m

Separate measurements shall be taken for each grouting application. The rate for payment shall include for flushing and capping of the borehole after completion of the grouting operation.

The grouting materials used for TAM grouting shall be measured for payment under **Particular Specification: PI 8.2.3**.

PSG 8.7.1.3 Materials used in all Grouting Operations.

a) Cementitious material ..... Unit : Pockets (Pkt)

The number of 50kg pockets of cementitious material actually used in the grouting operations shall be measured. The rate for payment shall include furnishing and batching and screening grout that was lost as a result of failure of equipment or on account of the Contractor's failure to comply with the requirements of this specification or which was rejected by the Employer's Agent as being

unsuitable for use in grouting operations, including grout that has not been injected within 2 hours after mixing and has subsequently been disposed of, shall not be measured for payment.

Distinction between different kinds of cementitious materials as scheduled shall be made.

b) Sand ..... Unit : m<sup>3</sup>

The volume of sand used in the grouting operation shall be measured separately in the dry.

c) Additives ..... Unit : kg

The mass of additive scheduled or ordered by the Employer's Agent shall be measured.

The rate for payment shall cover all costs of including the additives in the grout mix.

d) Bentonite ..... Unit : kg

The mass of bentonite used in the grout mix, on the instruction or approval of the Employer's Agent or where scheduled, shall be measured.

The rate for payment shall cover all costs of including bentonite in the mix.

e) Chemical grouts ..... Unit : kg

The mass of chemical grouts before mixing shall be measured. The rate shall cover all costs for handling, batching and mixing.

f) Grout cap ..... Unit : m<sup>3</sup>

The cubic metres of concrete needed to form the grout cap shall be measured. The rate shall include the cost of all materials and plant required for excavating for the cap, mixing and placing of the concrete, formwork and casting in of any standpipes or casings where ordered.

g) Rinsing drilled holes, filters and drains ..... Unit : hr

The number of hours of rinsing of drilled holes, filters and drains that the Employer's Agent has ordered to prevent clogging during the grouting operation shall be measured. Rinsing of a portion of a hole above a packer while injecting grout shall not be measured for payment.

h) Standpipes for grout holes ..... Unit : No

The number of holes, into which a standpipe is installed, shall be measured. The rate shall cover all costs incurred in complying with the relevant requirements of **Particular Specification: PI 5.3.1 (k)**.

PSG 8.7.1.4 Stand by for grouting installation ..... Unit : hr

The rate shall include the plant, ancillary equipment and labour associated with the item, that has been ordered, by the Employer's Agent, to stand by while awaiting further instructions.

It shall not cover time during which the plant and equipment are standing-by while tests and other operations necessary for the completion of the work are being carried out.

PSG 8.7.1.5 Pipes and channels for grouting systems ..... Unit : m

The length of pipe or channel required for the grouting system to be used for joint grouting shall be measured.

The tendered rate shall include the supply of all pipes (including all fittings and couplings) and the installation of the pipe system in the structure including any modification needed to formwork to accommodate the pipe system.

PSG 8.7.1.6 Grouting joints ..... Unit : No.

The number of compartments that are satisfactorily grouted shall be measured. Separate items shall be scheduled for compartments in the various sections of the works.

The tendered rate shall include all work involved in the grouting of the joints according to the requirements specified in the applicable **Particular Specification: PI 5.5** including pressurising adjacent compartments (where applicable).

**PSG 8.8 Cooling of Concrete**

**PSG 8.8.1 Special Surface Preparation..... Unit: m<sup>3</sup>**

When the Employer's Agent introduces an additional horizontal construction joint, not specified as such on the Drawings, due to a Site Instruction or a revised construction drawing issued to the Contractor, or due to interrupted pouring of concrete as directed by the Employer's Agent, the surface preparation of such a concrete surface as per **PSG 5.5.10** shall be paid for under this payment item.

**PSG 8.8.2 Cooling of Concrete..... Unit: m<sup>3</sup>. °C**

Volumes will be the actual volume in m<sup>3</sup> of the concrete that was placed at a temperature below the wet-bulb air temperature at the instant of placing. The temperature differences applied will be computed in °C as the difference between the maximum allowable placing temperature for the concrete in a particular pour and the average wet-bulb air temperature for that volume of concrete that was placed at a temperature below the wet-bulb air temperature at the instant of placing.



**PARTICULAR SPECIFICATION: PA**

**RIVER DIVERSION**

**PA 1 SCOPE**

This specification covers the minimum requirements in respect of the design, construction, maintenance and subsequent removal, where necessary, of the river diversion.

**PA 2 INTERPRETATIONS**

**PA 2.1 Supporting Specifications and Standards**

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

**PA 3 Definitions and Abbreviations**

For the purposes of this specification, the definitions and abbreviations given elsewhere in this document shall apply.

**PA 4 MATERIALS**

The materials used in the construction of the river diversion cofferdams shall meet the requirements of SANS 1200 PSD: Earthwork (Dam) and SANS 1200 PSG: Concrete (Structural) as appropriate.

**PA 5 PLANT**

The plant required for this work shall meet the requirements of the appropriate specification contained in this document.

**PA 6 DESIGN AND CONSTRUCTION**

**PA 6.1 General**

The Probability of peak events is provided in **Table 2** and the percentage of time the flow was exceeded in **Table 3**. The Contractor can utilise this to design the diversion work. The gauging station is T3H004 and primary data can be obtained for further analysis. At no time during the construction period shall the flow in the river be cut off. The Contractor shall be responsible for the detail design of the river diversion which shall be prepared as specified below.

The Contractor shall obtain the Employer's Agent's approval for any alternative proposal prior to commencing with the detail design of the river diversion works. The complete design and details of the river diversion works shall be submitted to the Employer's Agent at least 30 days prior to commencement of construction of the river diversion. The submission to the Employer's Agent shall consist of all hydraulic, structural and stability calculations, detail drawings and the construction sequence and stages for the diversion of the main river and tributaries. Material specifications, methods of construction, design loadings, design stresses on both the foundations and structural components and associated safety factors shall be clearly stated in the calculations and shown on the drawings as appropriate.

The designs shall be carried out by a Registered Professional who has, in the opinion of the Employer's Agent, adequate experience in such work.

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Approval by the Employer's Agent of the Contractor's alternative proposals (if any) and designs and the addition of any further requirement by the Employer's Agent shall in no way relieve the Contractor of his responsibility for the correctness and adequacy of the designs. The Contractor shall furthermore ensure that all the requirements of the designs and this specification are complied with.

The construction of the various stages of river diversion shall be commenced and executed strictly in accordance with the Contractor's approved Programme. The Contractor shall cease work on all those portions of the Works which are not vital to completion of any river diversion stage and concentrate all his efforts on completing the diversion works should this work at any stage be behind schedule.

**Table 2: Accepted peak floods at Kempdale Dam**

Annual Exceedance Probability							
1:2	1:5	1:10	1:20	1:50	1:100	1:200	RMF-Δ
39	232	420	630	955	1 230	1 520	1 835

**Table 3: Percentage of time the flow (m<sup>3</sup>/s) is exceeded**

%	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0
97	0.1	0.1	0.1	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1
96	0.1	0.1	0.2	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
95	0.1	0.2	0.3	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
94	0.1	0.2	0.4	0.6	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
93	0.2	0.3	0.5	0.6	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
92	0.2	0.3	0.6	0.7	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.2
91	0.2	0.4	0.7	0.8	0.5	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.2
90	0.2	0.4	0.7	0.9	0.6	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.3
89	0.2	0.5	0.8	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.2	0.3
88	0.3	0.6	0.8	1.0	0.6	0.4	0.3	0.3	0.2	0.1	0.1	0.2	0.4
87	0.3	0.6	0.9	1.0	0.7	0.4	0.3	0.3	0.2	0.2	0.1	0.2	0.4
86	0.3	0.6	1.0	1.1	0.7	0.4	0.3	0.3	0.2	0.2	0.2	0.3	0.5
85	0.3	0.7	1.1	1.1	0.7	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.5
80	0.4	0.9	1.5	1.4	0.9	0.5	0.4	0.4	0.3	0.2	0.2	0.4	0.8
75	0.5	1.1	1.8	1.7	1.0	0.6	0.5	0.4	0.3	0.3	0.3	0.5	1.0
70	0.6	1.4	1.9	1.9	1.1	0.6	0.5	0.5	0.3	0.3	0.3	0.6	1.2
65	0.7	1.8	2.1	1.9	1.3	0.7	0.6	0.5	0.4	0.3	0.3	0.8	1.4
60	0.9	1.9	2.6	2.2	1.5	0.8	0.6	0.5	0.5	0.4	0.4	0.9	1.7
55	1.0	2.4	3.1	2.5	1.7	0.9	0.8	0.6	0.5	0.5	0.5	1.1	1.9
50	1.2	2.9	3.6	3.0	1.9	1.1	0.9	0.7	0.6	0.5	0.6	1.3	2.2
45	1.4	3.4	4.2	3.4	2.2	1.2	0.9	0.8	0.6	0.6	0.7	1.5	2.5
40	1.7	4.0	5.0	4.0	2.5	1.4	1.0	0.9	0.7	0.7	0.8	1.8	2.9
35	2.0	4.7	6.0	4.8	2.8	1.5	1.1	0.9	0.8	0.8	1.0	2.1	3.2
30	2.4	5.4	7.2	5.5	3.3	1.7	1.2	1.0	0.9	1.0	1.1	2.5	3.7

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%	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25	3.0	6.3	8.4	6.6	4.1	1.9	1.3	1.2	1.1	1.2	1.4	3.0	4.5
20	3.9	7.6	10.0	8.5	5.1	2.2	1.5	1.4	1.3	1.4	1.8	3.7	5.3
15	5.2	9.2	12.8	11.1	6.0	2.6	1.9	1.7	1.6	1.8	2.6	4.7	6.7
14	5.5	9.7	13.4	11.8	6.3	2.7	2.0	1.8	1.6	1.9	2.9	5.0	7.1
13	5.9	10.1	14.5	12.5	6.5	2.8	2.1	2.0	1.7	1.9	3.1	5.3	7.5
12	6.3	10.9	15.2	13.1	6.9	3.0	2.3	2.1	1.8	2.2	3.5	5.6	7.9
11	6.8	11.6	16.2	13.9	7.2	3.1	2.4	2.2	1.9	2.3	4.1	5.9	8.4
10	7.3	12.1	17.0	14.9	7.7	3.3	2.5	2.4	2.0	2.5	4.6	6.3	9.0
9	8.0	12.7	18.3	15.8	8.2	3.5	2.7	2.5	2.2	2.7	5.3	6.7	9.6
8	8.7	13.3	19.6	16.8	8.6	3.8	2.9	2.7	2.5	2.9	5.8	7.1	10.5
7	9.6	14.4	21.5	18.2	9.3	4.0	3.1	3.0	2.7	3.1	6.9	7.5	11.4
6	10.7	15.6	23.4	20.0	10.5	4.3	3.4	3.5	3.0	3.4	7.8	8.2	12.5
5	12.1	17.2	26.4	22.7	11.7	4.8	3.8	4.3	3.2	3.9	8.9	9.1	14.6
4	13.9	19.9	29.9	25.1	13.3	5.3	4.2	5.2	3.5	4.6	9.9	10.0	18.0
3	16.6	22.5	32.4	29.5	15.7	6.3	5.4	6.1	4.2	6.2	11.4	12.2	21.4
2	21.1	26.4	38.0	33.5	18.7	8.2	8.2	7.7	5.1	8.2	14.0	14.4	25.9
1	29.8	32.2	38.0	38.0	25.5	11.9	14.6	10.1	6.6	12.1	19.3	19.5	32.7
0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	30.4	38.0	38.0	38.0	38.0	38.0

#### PA 6.3 Cofferdams

##### PA 6.3.1 Positioning of cofferdams

The positioning of the cofferdams as shown on the Drawings have been selected to minimise the volume of material required for construction and to provide adequate space for the various activities and also to facilitate the draining of seepage water from the excavations during construction.

##### PA 6.3.2 Design and Construction of Cofferdams

The Contractor shall determine the form of construction and design of the various cofferdams which shall be based on the following minimum requirements. Any specific requirements are detailed in the Scope of Works.

- The stability of the structures shall take due cognisance of the foundation conditions and method of construction.
- The cofferdams shall be constructed in accordance with the appropriate specification.
- The Contractor shall clearly state the proposed means and details of slope protection and impervious elements to control the rate of seepage and for the protection of the cofferdam and its foundation.
- The crest levels shown on the Drawings shall be considered the minimum requirements but the Contractor shall determine the actual levels to suit his proposals.
- The cofferdam crests shall have the minimum widths shown on the Drawings.
- The crests shall be constructed and maintained such that the level of any two points does not differ by more than 100mm.

At various stages in the construction of the river diversion it may be necessary to form the cofferdams on or against existing concrete structures. The Contractor shall submit, as part of his detailed proposals, information on the proposed method of sealing at such junctions. On completion, all components of the sealing method shall be removed.

The area enclosed by the cofferdams shall be continuously dewatered and maintained in such a way as not to interfere with the Contractor's operations and to ensure that the areas where work is in progress are kept continuously dry. Partial inundation of the area within the cofferdam will be permitted only if all work including finishing has been completed (and inspected by the Employer's Agent) to a height of at least 1 metre above the water level within the cofferdam. (Refer also Subclause PS D 5.2.2 of SANS 1200 PS D: Earthworks).

**PA 6.3.4 Maintenance**

The river diversion shall be maintained at the Contractor's expense for as long as required in the Contractor's approved Programme or as required by the Employer's Agent.

**PA 6.3.5 Demolition of Cofferdams**

Cofferdam demolition shall not be commenced until the Employer's Agent has given his written authorisation for the same and the Contractor has at his own cost complied with all conditions that may be imposed by the Employer's Agent for further river diversion and safeguarding the Works.

In general, authorisation for demolition will be granted as soon as the work (embankment or concrete), including finishing, has been completed (and inspected by the Employer's Agent) to a height of at least one metre above the applicable upstream cofferdam crest level.

Where it is required that other contractors execute work within cofferdams constructed under this Contract, the Contractor shall at his own expense continuously dewater to such levels and maintain such cofferdams for such periods as the Employer's Agent may order from time to time.

**PA 6.3.6 Modifications to Diversion System**

If during the period of operation of the river diversion, the Contractor wishes to modify existing proposals or structures, he shall inform the Employer's Agent prior to commencing such work. The Contractor shall submit to the Employer's Agent full details including additional calculations, drawings, and revised construction sequence, for his approval. This submission shall also include reasons for the proposed modification.

**PA 7 TOLERANCES**

Tolerances shall be as stated in the appropriate specification for the type of work being considered.

**PA 8 TESTING**

The requirements for testing shall be as given in the appropriate specification for the materials being examined.

**PA 9 MEASUREMENT AND PAYMENT**

**PA 9.1 Basic Principles**

Measurement and payment for excavation of the waterways or channels shall be measured and scheduled in accordance with SANS 1200 PSD: Earthworks (Dam).

Measurement and payment for pipework shall be measured and scheduled in accordance with SANS 1200 PSL: Medium-Pressure Pipelines.

Cofferdams shall be measured as complete units and shall include for all the activities required to construct the cofferdams to the requirements of this specification.

**PA 9.2 Scheduled Items**

**PA 9.2.1 Construction of cofferdam..... Unit: Sum**

Each cofferdam shall be scheduled separately. The sum shall include for the design, excavation of foundations through all materials, supply of materials from approved sources (including slope protection and impervious elements), construction, maintenance and removal.

**PA 9.2.2 Dewatering..... Unit: Sum**

The sum shall include for the provision, installation and continuous operation of adequate pumping units, including piping, power, temporary platforms and any other suitable equipment necessary to ensure that the area and excavations between the cofferdams is dewatered as required for construction purposes.

**PA 9.2.3 Employer's Agent Cut-off..... Unit: m<sup>2</sup>**

The rate shall include for the establishment and subsequent disestablishment of all necessary plant, and the creation and removal of all working platforms and access road for the forming of a contiguous row of *in situ*, jet grout columns to form the cut-off through the cofferdams and their foundations down to bedrock. The rate include for all measure to ensure that excess grout/bentonite does not pollute the river or any other watercourse. Measurement shall be the area of the columns calculated from the nominal width of ach column multiplied by its depth.

**PA 9.3 Payment**

The Employer's Agent shall certify for payment 70% of the tendered sum on completion of the cofferdam construction. 25% shall be certified for payment as equal monthly sums for the period shown by the Contractor's approved programme during which the cofferdam is required. The balance shall be certified for payment either on removal as specified or when the cofferdam is no longer required.

The tendered sum for dewatering will be certified as equal monthly sums for the period shown by the Contractor's approved Programme for the diversion sequence.

**PARTICULAR SPECIFICATION: PB**

**CONVENTIONAL CONCRETE FOR DAMS**

**PB 1 SCOPE**

This specification comprises the requirements for concrete work (plain and reinforced) for dam construction. It covers the supply and standards of materials, the plant and formwork required, the quality, manufacture, cooling and curing of concrete, the tolerances in workmanship, tests and acceptance criteria. This specifications covers particular specifications that are an addition to **SANS 1200 PSG CONCRETE (STRUCTURAL)**.

**PB 2 INTERPRETATIONS**

Interpretations shall be in accordance with **PSG CONCRETE (STRUCTURAL)**.

**PB 3 MATERIALS**

Materials shall be in accordance with **PSG CONCRETE (STRUCTURAL)**.

**PB 4 PLANT**

Plant shall be in accordance with PSG CONCRETE (STRUCTURAL) with the addition of the following:

Add the following to PSG 4:

**Cooling Equipment**

The Contractor shall provide cooling equipment previously approved by the Employer's Agent. The capacity of the equipment shall be such that the programmed production rate of the concrete can be maintained during any concreting operation. Sufficient standby equipment shall be available to ensure that concreting will not be interrupted. Where liquified nitrogen or other coolant is used the supplies on Site shall be sufficient for 2 weeks peak production of concrete.

Temperature Reading Equipment

The Contractor shall supply the following equipment :

- a) A digital type immersion thermometer to measure placing temperatures on the dam wall. It shall have a penetration probe length of approximately 700 mm and a temperature range from zero to 50°C (to an accuracy of 0,5°C).
- b) A minimum and maximum thermometer to measure the ambient temperature at the sites of both the mixing plant and of placing concrete. It shall have a temperature range of minus 10°C to plus 60°C to an accuracy of 0,5°C) and record the minimum temperature during the night and the maximum temperature during the following day.
- c) A sling hygrometer comprising a thermometer bulb permanently wetted as well as a normal thermometer.

Permanent temperature probes may be cast into various portions of the concrete works.

**PB 5 CONSTRUCTION**

Plant shall be in accordance with **PSG CONCRETE (STRUCTURAL)** with the addition of the following:

Add the following to G 5.1:

**Cutting**

No flame cutting of high yield steel bars shall be permitted without prior authorisation from the Employer's Agent.

**PARTICULAR SPECIFICATION: PC**

**INSTRUMENTATION**

**PC 1 SCOPE**

This specification is added in the event that instrumentation is required by a third party.

This specification covers the supply, installation and/or construction of the dam safety instrumentation systems for the concrete dams and their foundations, as well as for hydrometeorological, survey and water level recorder instrumentation.

The Contractor shall, in accordance with the Specification, the Drawings or as directed by the Employer's Agent:

- Supply, install and test electrical instruments and survey their positions and levels;
- Connect the electrical instruments to the data loggers installed inside the monitoring terminal by means of single and multiple cables including lightning protection boxes;
- Provide or construct protective surrounds and protective pipes for instruments and cables; and
- Supply portable and permanent recording equipment for instrument monitoring including all software and ancillaries.

All electrical instruments (i.e. vibrating wire) shall be capable of remote recording and monitoring.

All electrical instruments shall preferably be supplied by one Manufacturer. All electrical instruments shall be compatible with the automatic monitoring and recording system supplied.

The Contractor shall install and protect all instruments and cables in such a manner that damage to the instruments or cables is prevented and long-term operation is guaranteed.

The Contractor shall prepare the layout and plan the instrumentation installation methods in such a way that construction delays are minimised and the instruments and cables are not damaged by the construction work.

The Contractor shall supply the instruments, including measurement devices, calibration certificates, calibration devices, auxiliary equipment etc., and supervise the installation and initial reading of the instruments. He shall arrange for the work to be carried out at the locations shown on the Drawings or where directed by the Employer's Agent.

The Contractor shall monitor and record the instrumentation readings until the issue of the Taking-Over Certificate. Immediately after taking measurements he shall submit the records to the Employer's Agent for evaluation.

The installation and monitoring of instruments shall be undertaken by a Manufacturer's/Supplier's specialist unless the Contractor has personnel who, in the opinion of the Employer's Agent, are suitably experienced to undertake the work.

The Contractor shall be required to provide training to the Employer's Agent's and Employer's staff on the operation, maintenance, reading and calculation required for each type of instrument and the Central Automatic Recording systems including, but not limited to, the operation of the software. The Method Statement for installation and reading of instruments and presentation of results shall be agreed with the Employer's Agent prior to any work being undertaken. The results of all readings, plotted on graphs as agreed, shall be handed to the Employer's Agent within 24 hours after readings have been taken. On request the Contractor shall also provide the Employer's Agent with the data of all readings to date in electronic format on compact disk.



**PC 2 INTERPRETATIONS**

**PC 2.1 Supporting Specifications and Standards**

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

**PC 2.2 Definitions and Abbreviations**

For the purposes of this specification, the definitions and abbreviations given in the specifications and standards elsewhere in this document and the following abbreviations shall apply :

AC	:	Alternating Current
DC	:	Direct Current
FS	:	Full Scale
R-T	:	Resistance-Temperature
UPS	:	Uninterrupted Power Supply
uPVC	:	unplasticized Polyvinyl chloride

**PC 3 MATERIALS, design and information on instrumentation**

**PC 3.1 Information to be supplied**

**PC 3.1.1 Information to be supplied with Tender**

Together with the submission of his Tender, the Contractor shall provide the following information:

- Name and address of manufacturer of instruments and Supplier/Subcontractor responsible for the supply, installation and initial reading of instruments;
- List of similar projects in which, over the past 10 years, the relevant instruments have been satisfactorily installed;
- Full technical details of proposed instruments;
- Details of the hardware and software proposed for the automatic monitoring and data evaluation which shall be compatible with the selected instruments;
- Curriculum vitae of key personnel of the Supplier/Subcontractor and Contractor responsible for the installation and reading of instruments;
- Curriculum vitae of the person responsible for the programming of the data logger; and
- In his proposals the Contractor shall take account of the location of the dam site, the climatological conditions, the type of dam and the construction process.

**PC 3.1.2 Information to be supplied before Commencement of Instrument Installation**

The Contractor shall, with due cognizance of the time required to order and supply the instruments, but not later than 90 days prior to the installation of the first instrument, submit to the Employer's Agent for his approval the following information and any other information required by the Employer's Agent:

- A detailed layout of the instruments and cabling system and routing, based on the relevant Drawings;
- A detailed description of instruments finally selected and the ancillary measuring equipment;
- The Contractor's Method Statement for the installation, testing and operation of the mechanical and electrical instruments, based on procedures prepared by the Manufacturer and/or Suppliers;
- Details of permanent power supply requirements and the layout of all equipment and accessories to be installed in the monitoring terminal;
- Curriculum vitae of the supervisor assigned for the installation and reading of instruments; and
- Samples of all cables proposed to be used.

During the execution of the Works, the Contractor shall submit to the Employer's Agent any further details regarding the instrumentation that require the Employer's Agent's approval.

Not less than 25 days before the anticipated date of installation of instrumentation in any particular location, the Contractor shall submit to the Employer's Agent for his approval details of his proposed installation procedure, details of the ongoing construction work in the vicinity of the instrument installation, the programmed sequence of events for the installation including details on the instrument(s) to be installed and their location(s), calibrating, personnel in charge, labourers, construction equipment and materials to be used. Within 15 days after the submission of the details, the Employer's Agent will give his approval with such modifications as may be deemed necessary.

### PC 3.2 Piezometers

The specifications for the pore water pressure (vibrating wire) piezometer are as follows:

- Maximum dimensions: length = 150 mm, diameter = 25 mm
- Material: 316 stainless steel, porous filter (sintered 316 stainless steel)
- Range: 100 m water pressure
- Over range: 2x rated pressure
- Accuracy:  $\pm 0,5\%$  F.S.
- Linearity:  $< 0,5\%$  F.S.
- Working Temperature: -10 to 75 °C
- Maximum mass: 250 g
- Temperature gauge: Thermally sensitive resistor measuring 3 000 Ohm at 25 °C located in the housing
- Lightning protection: Gas discharge tubes inside housing

### PC 3.3 Temperature Gauges

The temperature gauges shall be of the resistance type. The sensor shall be encapsulated in an approved splicing kit. The connecting cable shall have low resistance conductors with heavy duty insulation.

The temperature gauges shall be thermally sensitive R-T curve matched thermistors measuring 3 000 Ohm at 25 degrees, installed using single or multi paired cables.

The minimum specification is as follows:

- Resistance at +25°C: 3 000 Ohm
- Temperature range: -55°C to +150°C
- Tolerance (0 to +70°C):  $\pm 0,2^\circ\text{C}$
- Dissipation constant: 1 mW
- Time constant: 10 s

#### Definitions:

##### *Dissipation constant:*

Represents the amount of power required to raise the temperature of the thermistor 1°C above its ambient temperature, expressed in milliwatts.

##### *Time constant:*

The time required for the thermistor dissipating zero power to change 63% of the difference between its initial temperature value and that of a new impressed temperature environment.

Although multi core cables may be used, each thermistor shall be connected to an individual twisted pair of wires. The instrumentation cable shall at the point where the thermistor is installed be covered with a splicing kit approved by the Employer's Agent. The use of multi core cables with multiple thermistors at different intervals is recommended.

**PC 3.4 Crack Width Gauges**

Crack width gauges approved by the Employer's Agent shall be installed as indicated on the drawings, or as requested by the Employer's Agent. The final positions and amount of crack width gauges to be used might change during the construction period.

**PC 3.5 Piezometer Filter Sand**

Filter sand for the piezometer installations shall be supplied by the Contractor. It shall be a clean, uniformly graded sand between 0,5 mm and 1,2 mm.

**PC 3.6 Bentonite and Cement/Bentonite Sealing Material**

Bentonite used to form a watertight plug in instrument boreholes shall be supplied by the Contractor in the form of compressed pellets.

Cement/Bentonite used for the backfilling of instrument boreholes shall be supplied by the Contractor in the form of pellets or powder. In each case the ratio of cement to bentonite shall be 1:1,25 kg by weight.

All bentonite and cement/bentonite pellets or powder shall be supplied in thick polythene bags with the manufacturer's name clearly marked.

**PC 3.7 Cables**

The general specifications for all instrumentation cables follows:

**Individual pairs**

Conductor:	0,5 mm <sup>2</sup> (16 / 2,0 mm Ø tinned copper wire)
Conductor insulation:	PVC (0.5mm radial wall thickness)
Type of pairs:	Twisted
Number of twists per meter:	16 to 18
Color coded:	Def spec 61 – 12 (part 5)
Screen for each pair:	Aluminium-polyester foil free edge tape (0,05 mm radial wall thickness) plus 7/0,20 mm Ø tinned copper drain wire

**Screened pairs laid up**

Overall screen:	Aluminium-polyester tape (0,037 mm thickness) plus 7/0, 20 mm Ø tinned copper drain wire
Bedding:	PVC (0,9 mm radial wall thickness)
Overall screen:	Tinned copper wire braid(85% coverage)
Outer sheath:	Polyurethane (1,5 mm radial wall thickness)
Color of outer sheath:	EAU DI NIL (SABS number H43)
Marking on cable:	Instrumentation cable (Arial 12, black)
	Minimum intervals: 250 mm
Current rating:	3 Amp

All cables shall be approved by the Employer's Agent.

**PC 3.8 Automatic recording system**

Each of the automatic recording systems shall consist of the following:

- Power supplies;
- Data logger system with multiplexers ;
- Lightning protection (can be seen as junction boxes);

- Cellular modem for remote connection; and
- Spread spectrum data radios (if needed).

The data logger shall have the facility for connection to a laptop computer.

#### **PC 3.8.1 Data logger**

The specifications of the data logger shall be approved by the Employer's Agent.

The data logger shall have the following minimum specifications:

- 4MByte internal memory with an option for external removable memory up to 1 GByte (the memory shall be sufficient to store the program and 90 sets of readings);
- Minimum 8 differential channels, expandable to 512 differential channels;
- Minimum 2 different excitation channels. Excitation from 0 – 2 500 mV; and
- 5 volt DC supply from logger;
- Uncontrolled and program controlled 12 volt DC supply from logger;
- Programmable to do mathematical calculations and sent SMS signals; and
- Data collection via RS232 or USB port. Option to connect communication radios and cellular modems for data collection.

#### **PC 3.8.2 Vibrating wire interface**

The interface must be able to interface both temperature (thermistors) and frequency measurements from vibrating wire sensors with a frequency sweep range of 250-9 900 Hz. The current drain during the vibrating wire measurement (170 ms to 500 ms) shall not exceed 32 mA.

#### **PC 3.8.3 Relay Multiplexers**

The main function of the multiplexers is to switch low level analog signals. Each multiplexer must be able to multiplex a minimum of 16 single-ended or differential sensors that require excitation, or 32 single ended or differential analog sensors that do not require excitation. The active current drain shall not exceed 6 mA.

#### **PC 3.8.4 Surge voltage protection**

Surge voltage protectors shall be placed on each wire in line between the individual instruments and the data logger to supplement the datalogger's built in surge protection. Surge protection shall be provided by gas filled arrestors that trigger at 5 VDC. Each surge protector shall protect one or two separate conductors and provides a terminal for shield wires.

Surge voltage protectors shall be placed in individual enclosures in the monitoring terminal. The protectors shall be connected to a dedicated connection to earth, and not to the same earth to ground system used by other electrical equipment.

#### **PC 3.8.5 Cellular communication**

A cellular modem with a data SIM card shall be connected to each data logger. Cellular communication to all data logging stations (temporary and permanent) shall be available at all times. The modem shall be powered from a 12 Volt, 7,2A H/20 H, rechargeable valve regulated (sealed) battery or from the data logger. The cellular modem shall be placed at the position of the Aerial, depending on the conditions at the site. The final position of the cellular modems according to the cellular signal strength at the site and the route for the communication cables and/or aerial wires shall be determined by the Contractor on site and approved by the Employer's Agent.

Cables between the data logging station and the cellular modem should preferable be embedded into the concrete during construction.

**PC 3.8.6 Radio communication on site**

Each data logger shall be equipped with a 900 MHz frequency hopping, spread spectrum data radio. Repeater stations for the radio communication shall be erected at a position from where radio communication to the offices of the Contractor and the Employer's Agent is possible. The radio shall be powered from a 12 Volt, 7,2AH/20H, rechargeable valve regulated (sealed) battery or from the data logger. The radio at the repeater station shall be powered from a 12 Volt, 7,2A H/20 H, rechargeable valve regulated (sealed) battery, charged with a solar panel or a permanent power supply, depending on the position of the site. The use of the repeater station shall be superfluous if direct communications between the logger stations and the offices are found to be possible.

**PC 3.8.7 Batteries, 12 Volt supply and battery chargers**

Individual uninterrupted power supplies shall be permanently installed for each data logging station.

12 Volt, 7,2AH/20H, rechargeable valve regulated (sealed) batteries shall be used as power supply to all equipment.

Batteries, UPS's, power supplies and trickle chargers shall not be allowed inside the same enclosures as the data loggers, or inside the enclosures with the lightning protection.

**PC 3.9 Readout station**

Temporary and permanent readout stations shall be provided as indicated on the Drawings.

**PC 3.9.1 Enclosures for temporary data logging stations**

Waterproof enclosures manufactured from any type of material suitable for construction activities may be used for temporary data logging stations. The temporary enclosures must be approved by the Employer's Agent.

**PC 3.10 Monitoring Terminal**

The permanent data logger shall be installed in the monitoring terminal as soon as possible. The final size of the monitoring terminal shall be approved by the Employer's Agent when the sizes of the enclosures are known. The monitoring terminal shall be equipped with a lockable stainless steel gate approved by the Employer's Agent, and shall be locked at all times.

Only instrumentation cables shall be allowed inside the monitoring terminal. All cables shall be fastened against cable racks manufactured from stainless steel grade 316. The cable racks used for instrumentation purposes shall be similar design to other cable racks used in the dam, or approved by the Employer's Agent.

**PC 3.10.1 General**

Different enclosures shall be used for:

- Data Logger and multiplexers
- Lightning protection (used as junction box)
- Power supply
- Empty container

Individual enclosures shall be permitted for each data logger and multiplexer, or more than one item in each enclosure. All enclosures shall be big enough to house all the equipment with ease. The size of the different enclosures shall depend on the type of data loggers and multiplexers used by the contractor.

All wires from multiple core cables inside the enclosures being stripped from the outside protection shall be covered with spiral binding and attached to the enclosure with mounting cradles and/or cable

ties. All equipment and cables shall be fastened to a backing plate located inside at the back of the enclosure.

All enclosures shall have built in lockable systems in the doors, or a built in system for a padlock. Additional bolts shall be permitted to ensure an airtight seal around the door.

The battery voltage and the temperature inside all individual enclosures shall be monitored continuously.

The layout of the enclosures and detailed specifications of all enclosures, temporary and permanently, standard or specially manufactured, shall be provided to the Employer's Agent in advance for his approval.

All enclosures shall be powder coated with the following color:  
EUA DI NIL (SABS Number H43)

**PC 3.10.2 Enclosures containing the Data Logger and multiplexers**

The enclosures for the lightning protection shall be of 1,6mm grade 316 stainless steel with one door in front of the enclosure. The door shall have 2 or more hinges hidden behind the door with the door removable by unclipping the hinges. The Data Logger and the multiplexer may be placed in the same enclosure permitted that the size of the enclosure does not become unpractical.

The enclosure that houses the Data Logger and/or multiplexers shall be tested for a period not less than 24 hours to withstand zero air pressure inside the enclosure (vacuum). A certificate from the manufacturer shall be provided to the Employer's Agent.

The containers shall be completed in advance with mil spec connectors provided at the bottom of the enclosures for the joining of the cables. Only 12V DC shall be permitted inside the containers.

Cables to the enclosures shall be connected with mil spec connectors. Cable glands shall not be permitted.

**PC 3.10.3 Enclosure containing the lightning protection**

The enclosures for the lightning protection shall be of 1,6 mm grade 316 stainless steel with one door in front of the enclosure. The door shall have 2 or more hinges hidden behind the door with the door removable by unclipping the hinges.

**PC 3.10.4 Mounting of enclosures**

All enclosures shall be mounted against the vertical wall of the monitoring terminal and 20 mm from the concrete surface with appropriate grade 316 stainless steel bolts. Fastening of the enclosure from the inside of the enclosure (bolts through the back plate of the enclosure) shall not be allowed.

The centre of the instrumentation inside the enclosure shall be 1,5 m above the floor of the monitoring terminal, or at a height approved by the Employer's Agent. The instrumentation cables in all enclosures must be easily accessible after installation.

**PC 3.10.5 Standard enclosures**

Standard enclosures supplied by the manufacturer of the instruments or data logger shall be permitted, provided that all the above criteria are met. The color of all enclosure shall be as specified.

**PC 3.10.6 Enclosures for the UPS, Batteries, 12 Volt Power Supply and Battery Chargers**

The size of the enclosure will depend on the size of the equipment placed inside. The enclosure shall be grade 316 stainless steel, or a material approved by the manufacturer of the equipment inside the enclosure. The enclosure shall be vented, heated or sealed according to the specifications of the manufacturer or manufacturers of the equipment inside the enclosure.

#### **PC 10.7 Empty enclosure**

An empty enclosure shall be installed at a position close to the enclosure accommodating the data logger. The hinges of the empty enclosure shall be placed at the bottom of the door, allowing the door to open to a horizontal position to be used as a table. A rubber mat shall be fixed to the inside of the door (top of the table). Stainless steel cables shall be used to prevent the door from opening past a horizontal position.

The minimum sizes of the enclosure shall be 400 mm x 400 mm, or identical to the enclosures being used.

Details of the enclosure shall be provided to the Employer's Agent in advance for his approval

#### **PC 3.11 Hydrometeorological Equipment**

The meteorological station to be constructed at the Site shall be supplied by and approved supplier and shall include the following equipment:

- Wireless vantage pro 2 with console, anemometer, barometer, rain gauge, temperature/humidity shield and mounting hardware;
- Weatherlink software package and serial interface;
- Solar radiation sensor;
- Wireless evaporation calculation station with probe;
- Mounting for solar radiation sensor;
- 5V Direct Current supply;
- Solar panel;
- 7Ah Battery;
- Voltage regulator; and
- Cellular phone modem.

#### **PC 3.12 Reservoir Water Level Measurement**

Instruments shall be installed as shown on the drawings.

#### **PC 3.13 Survey Beacons**

Beacons shall be installed as shown on the drawings and refer to **PS 6-7**.

#### **PC 4 PLANT and personnel**

The Contractor shall utilise such plant and equipment as is necessary to safely and efficiently carry out the installation, testing and commissioning of the items covered by this Specification.

The Contractor shall employ only approved skilled technicians, trained by the subcontracted Manufacturer and/or Supplier for the installation and monitoring of instruments and the recording and evaluation of the measurements. The work shall be performed under the direct supervision of an approved supervisor, who is well experienced and skilled in installation of all types of instrumentation, understands the purpose and function of all instruments being installed, is experienced in the field of dam construction, construction techniques and construction control and understands the anticipated behaviour of the relevant structure.

The Employer's Agent has the right to ask for the replacement of any of the technicians or the supervisor if he deems it to be necessary with respect to the proper installation, testing and monitoring of instrumentation.

**PC 5 CONSTRUCTION**

**PC 5.1 General**

All instruments shall be stored on site before installation in a secure, weatherproof and lockable building or container. The Contractor shall have all ancillary equipment, parts, fittings and materials as well as specifically required tools available for the installation of the instruments.

All instruments shall be installed complete with auxiliary equipment, devices, cables, tubes, protection measures and services to warrant proper function for the intended measuring purpose. Manufacturer's instructions are to be observed with respect to handling, testing, calibration, installation and functional testing.

The initial installation of each type of instrument, including calibration and functional tests, shall be performed under the direct supervision of the Manufacturer's expert who shall give on-the-job training to the Contractor's supervisor and approved technicians who are responsible for the installation, testing and monitoring of instruments.

The Contractor shall also:

- Provide notches and openings in concrete for the installation of the instruments, cables and tubes;
- Where required provide a sand bed and backfilling around instruments;
- Assemble the instruments and install them in the presence of the Employer's Agent at locations as indicated in the Drawings or as directed by the Employer's Agent. The installation shall preferably be performed during daylight hours. If the installation has to be performed during night time or inside the gallery, the Contractor shall provide sufficient lighting to ensure proper execution of the installation work;
- Protect the installed instruments and cables or tubes against damage;
- Connect cables and tubes in the maximum practicable length to the instruments and install them in horizontal, vertical and inclined sections without joints, combine single cables with multiple cables as appropriate and, where permitted and approved by the Employer's Agent, splice and couple cables in accordance with the Manufacturer's recommendations;
- Determine the exact location and elevation by topographic survey immediately after the installation of the instrument; and
- Tag all cables and tubes with identification tags approved by the Employer's Agent at intervals of approximately 20 m and at the ends of the cables or at such closer intervals as necessary to provide continuous identification.

If, as determined by the Employer's Agent or Contractor, there has been any damage to or displacement of the instruments and connections during the installation and progress of work, the Contractor shall immediately repair the damage or replace the instruments to the satisfaction of the Employer's Agent, all at the expenses of the Contractor.

All materials and works shall be in accordance with the relevant parts of this Specification.

**PC 5.2 Drilling of Holes for Instruments**

All holes for the installation of instrumentation shall be drilled at the locations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent. Instrumentation holes shall generally be drilled by percussion type methods using bottom hammer equipment, unless otherwise instructed by the Employer's Agent. Where holes for instrumentation are to be drilled through placed earthfill embankment materials, continuous flight auger shall be used for such drilling.



Each hole drilled shall be protected from becoming clogged or obstructed until such time as the instrumentation is installed. Where casings are installed in caving ground, these shall be left in the hole until such time as the Employer's Agent approves their removal.

**PC 5.3 Excavation and Backfilling of Holes and Trenches**

Trenches for the installation of casings and cables shall be excavated by hand.

The Contractor shall exercise great care during construction of the dam to ensure that the equipment and cabling etc., is not disturbed or damaged in any way. Cables shall be placed in trenches filled with skin concrete and vibrated before the placing of CVC commences. The size of the trenches shall be determined on site and approved by the Employer's Agent. All cables shall be clearly marked and protected from damage by construction equipment and vehicles.

Trenches shall be filled with concrete conforming to the drawings and Particular Specification 32 – Conventional Concrete for Dams.

**PC 5.4 Installation of Tubes and Cables**

All tubes and cables shall be installed in a single length between the instrument and the terminal measuring point, if possible. Where multiple tubes or cables are laid in the same trench, they shall not cross over another and a minimum distance of 20 mm shall be maintained between adjacent lines.

The length of tube or cable installed shall not be the absolute minimum, putting undue stress on the end connections. A degree of slack must be allowed for along the length of the tube.

**PC 5.5 Installation of Piezometers**

**PC 5.5.1 General**

The location of each piezometer and the cabling system shall be as shown on the Drawings or approved by the Employer's Agent.

**PC 5.5.2 Installation of a Piezometer in a Borehole**

The Contractor shall supply and install pore water pressure cells which operate on a vibrating wire principle. Each individual piezometers shall be connected to the monitoring terminal by means of a high pressure water proof cable, approved splicing kits and heavy duty multi-core collector cable.

The installation of the piezometers after it is tested and connected to the multi core cables shall be as follows:

- Remove all water from the bore holes. The Employer's Agent shall be informed if water keeps on filling the bore hole, and the information documented. The Employer's Agent shall decide if the installation may continue in the water;
- Measure the reduced level of the top of the bore hole;
- Measure the depth of the bore hole and calculate the depth at which the lowest instrument must be installed from the top of the bore hole;
- Document the serial number of the piezometer to be installed;
- Fill the bore hole with a non shrink grout to a level of 0,5 m below the height were the piezometer must be installed. The grout must be feed through a plastic pipe to prevent the sides of the bore hole from getting clogged with grout;
- Mark the length on the instrumentation cable, and lower the instrument into the bore hole to the correct height;
- Fill the bore hole with dry sand to a height of 0,5 m higher than the height where the piezometer was installed. The sand must be feed through a pipe to prevent the sides of the bore hole from getting clogged with sand. The depth must constantly be monitored and shall not exceed the correct height;

- Take a photograph to show that the instrument is installed at the correct height;
- Fill the bore hole with a non shrink grout to a level of 0,5 m below the height were the second piezometer (5 m higher than the first piezometer) must be installed; and
- Install the piezometer in the same manner as the lowest piezometer, and continue the process until all the piezometers are installed.

### **PC 5.5.3 Piezometers for water level recording**

Piezometers for water level recording shall be installed as indicated on the Drawings.

### **PC 5.6 Installation of Temperature Gauges**

The temperature gauges shall be installed at the locations shown on the Drawings and particular care shall be taken to ensure that each gauge is held securely in the correct position and is not damaged by the concrete placing activities. Cables shall be fastened to cable racks approved by the Employer's Agent.

The installation of thermistors along a multi core cable shall proceed as follows:

- The polyethylene sheath shall be opened or removed at the point where the thermistor must be installed;
- The correct twisted pair of wires shall be identified without opening any other cables;
- The two wires shall be cut and pulled away from the bundle of twisted pairs in the multi core cable;
- The thermistor shall be connected (soldered) to the two wires and the soldered lengths covered with an appropriate epoxy filled heat shrink;
- The cable shall be cleaned with a chemical dissolvent;
- The open part on the cable shall be covered with a splicing kit. The wires with the thermistor attached shall not be pushed back into its original position, but shall be placed away from the other wires;
- All the wires shall be spaced inside the cable joint away from the sides, and opened in such a way that the epoxy resin can enter between all the wires; and
- The instrument shall be tested, and the splicing kit filled with epoxy.

One connected thermistor (before the splicing kit is filled with epoxy) shall be supplied to the Employer's Agent for his approval before the first installation starts.

### **PC 5.7 Monitoring Terminal**

Construction of the monitoring terminal shall be to the dimensions shown on the Drawings, or as approved by the Employer's Agent.

They shall be constructed to enable cables to be terminated in the monitoring terminal as the instruments are installed.

### **PC 5.8 Crack Width Gauges**

Crack width gauges approved by the Employer's Agent shall be installed as indicated on the drawings, or as requested by the Employer's Agent. The final positions and amount of crack width gauges to be used may change during the construction period.

Before installation of the unit, the concrete in the area shall be inspected to ensure that there are no irregularities to affect the operation of the instrument. If necessary, any protrusion shall be rubbed down.

**PC 5.9 Cabling**

**PC 5.9.1 General**

The placing of cables in the dam is a delicate procedure and is to be carried out by trained technicians. Only approved cables and splicing kits shall to be used. The sequence in which the different twisted pairs of wires will be used shall be planned and approved by the Employer's Agent. The sequence shall at all times be followed in all installations.

**PC 5.9.2 Types of Cables, Jointing and Installation**

The location of the cables shall be, if possible at the time of installation, be as shown on the Drawings. The Contractor shall provide a detailed layout of the cabling for approval by the Employer's Agent. Cables shall be laid where it will not be damaged during later construction activities such as drilling.

The Contractor shall supply and install special measurement cables which are compatible with the installed instruments. Heavy duty insulated multi-pair cables shall be connected to the instruments as necessary. Several cables in a measuring section shall be joined to multiple cored cables. All pairs shall be individually screened and overall screened. The transition from a single pair cable to a multi pair collector cable shall be by means of a cable joint approved by the Employer's Agent. The cables shall be appropriate to be affixed to and embedded in concrete were required.

The use of splicing kits and junction boxes shall be planned before the installation and be approved by the Employer's Agent. Additional splicing kits and junction boxes shall not be allowed without written permission by the Employer's Agent. Cables shall not be joint unnecessary, and not without the permission of the Employer's Agent. Joint wires inside splicing kits shall be individually soldered and covered with an appropriate epoxy filled heat shrink. The length of heat shrink shall be twice as long as the unprotected part of the wire that has to be covered. Earth wires shall be individually connected and protected in a way that they do not touch each other.

Pairs of wires shall under no circumstances be stripped from the polyethylene insulated cover unless it must be joint, or a thermistor must be connected to the wires. Aluminium-polyester tape covering twisted pairs shall only be removed when instruments are connected. An AC/DC open jaw current searcher (electrical equipment) shall be used to identify wires inside multi core cables when thermistors must be installed inside along the length of the cable.

Handling, storage and placing of the cables shall be in strict accordance with the Manufacturer's instructions.

**PC 5.10 Hydrometeorological Equipment**

The full meteorological station shall be installed and commissioned at the location and to the details shown on the Drawings within 30 days of the commencement of the Works. The security fencing around the station together with the access gate shall be erected. During the course of construction of the Works, the Contractor shall ensure that no obstacles are place within 15 m of the fence line.

**PC 5.11 Installation Records**

The Contractor shall submit to the Employer's Agent within 3 days of the installation of each instrument, a detailed installation record. The record sheet shall include the following data :

- (a) Instrument type and model.
- (b) 3-dimensional co-ordinates of the instrument, specified and actual, together with orientation.
- (c) Type and model of readout unit.
- (d) Serial numbers of all components, if applicable.
- (e) Dates of commencement and completion of installation.
- (f) Lengths of tubing, casing or cables installed, including specific markings as applicable.

- (g) Method of installation and in the case of piezometers, the lengths of filter material, bentonite plug, backfill and casing.
- (h) Results of calibration and testing.
- (i) Initial readings.
- (j) Sketches and remarks as necessary.

**PC 6 TOLERANCES**

The instruments installed in the concrete section shall be installed within 100 mm of the positions specified on the Drawings. Other tolerances shall be as specified in the appropriate specification or standard.

**PC 7 TESTING and monitoring**

**PC 7.1 Testing**

Where applicable, each instrument shall be tested for correct operation and then calibrated. All instruments shall be tested and calibrated by the Manufacturer. The Contractor shall provide copies of such test and calibration certificates to the Employer's Agent. These instruments shall also be tested and, if required, recalibrated in the presence of the Employer's Agent before installation. If the instrument cannot be successfully tested, it shall be removed and a replacement unit installed.

**PC 7.1.1 Calibration of piezometers**

Each individual instrument shall be tested and all instruments calibrated on site before installation. The testing of the pore pressure gauges on site shall be done as follows:

- Each instrument shall be placed in an approved and save calibration tank.
- The pressure shall be increased from zero to 100 m water pressure in steps of 10 m water pressure. The instrument shall be left to settle before readings are taken with a data logger similar to the loggers used in the final installation.
- The pressure inside the calibration tank must be decreased slowly to prevent damage to the instruments as a result of high pressures inside the gauge compared to a low pressure inside the calibration tank. Readings shall be taken at the same intervals as before. (100, 90, 80...10)
- The complete test shall be repeated 3 times.
- The results of each instrument compared to the calibration data shall be presented to the Employer's Agent in table and graph form for his approval.
- The pore pressure gauges shall be left on the shelf for ninety days to settle before it is installed. Monitoring shall be done weekly and all results recorded.
- The Employer's Agent will finally approve the use of each instrument after the results have been studied.

The coordinates and height on the concrete/rock contact level of each vertical line of piezometers shall be determined and clearly marked after the foundation is prepared (opened), and before any concrete is placed. Individual close photographs shall be taken of each position before the concrete is placed. Photographs showing as many of the positions as possible shall also be taken. Flags or other objects shall be placed on each position to help with the identification on the photographs.

**PC 7.1.2 Calibration of temperature gauges**

Each individual temperature sensor (thermistor) shall be tested as follows before it is connected to any instrumentation wires/cables:

- The maximum number of thermistors shall be connected to a multiplexer (or more if preferred) connected to a data logger similar to the data loggers that will be used in the installation.
- The multiplexer with the thermistors shall be placed in an isolated container of which the temperature can be regulated.

- The isolated container shall be equipped with a calibrated temperature gauge of equal or better characteristics than the thermistors
- The temperature inside the isolated container shall be set at 20°C(± 2°C) and a set of readings from the thermistors taken with the data logger. The temperature inside the container shall be stable when the measurement is taken.
- The test shall be repeated for temperatures at 30°C(± 2°C), 40°C(± 2°C) and 50°C(± 2°C) respectively.
- All thermistors with a temperature deviation greater than ± 0,2°C compared to the known calibration temperature shall not be used in the installation.
- All thermistors shall use the same calculation formula. Additional factors to compensate for thermistors outside the given specification shall not be allowed.
- The results of the tests shall be presented to the Employer's Agent before the thermistors are used.

### **PC 7.1.3 Testing cable connections before final installation**

The following method for testing the function of the instruments shall be followed during the installation of all instruments:

- All instruments shall be placed as close as possible to its final installed position and individually tested before it is connected to multi core cables.
- The instruments shall be connected to the multi core cables placed in its final position and a second set of readings taken at the location of the data logger (the end of the multi core cable).
- The multi core cables shall now be connected to the data logger, and one set of readings taken with the data logger.
- The different sets of readings shall be compared, and all malfunctioning instruments replaced.
- The Employer's Agent shall approve the cable connections and readings before the cables and instruments are covered.
- The data logger shall start logging data immediately at the prescribed intervals.
- The instruments shall be installed and the cables covered as prescribed.

The calibration data and the 3 sets of data shall be reported to the Employer's Agent immediately in writing.

## **PC 7.2 Monitoring**

### **PC 7.2.1 Data logger programmes**

All programmes for temporary and permanent data loggers shall be written in advance and the program supplied to the Employer's Agent for his approval before it is implemented on site. Each data logger shall receive the signals from the instruments, calculate the results using mathematical formulas, combine them with programmed criteria, recognise the approach of predetermined data limits, store the data and send an SMS message to 3 cellular telephones if necessary. The results for the temperature measurements shall be given in degrees Celsius, and for the piezometers in meter water pressure as a reduced level compared to the reduced levels at the dam. The data loggers shall be permanently connected to cellular modems.

Monitoring shall initially be done at 20 minute intervals and can later be changed to less or higher intervals as directed by the Employer's Agent.

Temperature and pore pressure are monitored at each piezometer. The data logger and the program shall have the ability to monitor both reading at the same time, only one of the two readings, and both readings at different time intervals.

The program shall have the ability to use the following information during evaluations:

- Time of the year in quarterly intervals; and
- Water level in the dam basin at 10 m intervals.

Provision shall be made in the program to store limits for the above conditions for all the different instruments. The limits for the temperature gauges shall initially be set between zero and 80°C, and for the pore pressure gauges at 20 m higher than the installation level and 20 m below the installation level.

Pore pressures shall be calculated for instruments in horizontal and vertical lines, and the results tested against pre-programmed criteria. The uncalculated readings from the pore pressure gauges and the results after calculation shall be stored in separate file.

During the entire construction period, the Employer's Agent shall regularly calculate limits for each instrument and supply the Contractor with the limits that has to be set in the programs.

The amount of SMS messages send shall be counted, and messages shall not be send more than once a day for the same condition. Provision shall however be made in the program for SMS messages be send more than once a day if additional conditions are met. These conditions shall be calculated during the construction period and provided to the Employer's Agent.

**PC 7.2.2 Monitoring computers**

The Contractor shall provide 2 desktop computers of latest advanced technology for real time monitoring in the offices of the Contractor and the Employer's Agent. The computers shall be dedicated to the real time monitoring and presenting of instrumentation results only. The contractor shall provide all the necessary legal programs for the communication and real time monitoring at both offices.

The Contractor shall provide a laptop computer of latest advanced technology with colour printer and software, all approved by the Employer's Agent, for the statistical evaluation and presentation of the dam instrumentation. The laptop computer shall be equipped to allow the direct collection of data from the data logger or via cellular modem and with the use of radio communications.

**PC 7.2.3 Results**

The instrumentation results shall be daily supplied via e-mail to the Employer's Agent.

**PC 8 MEASUREMENT AND PAYMENT**

**PC 8.1 General Principles**

Drilling of the boreholes for the vibrating wire piezometers and temperature gauges shall be measured and paid as provided in **Particular Specification: PI Drilling.**

**PC 8.2 Scheduled Items**

**PC 8.2.1 Calibration of instruments..... Unit : No**

The rate shall cover the amount of instruments calibrated and the calibration data supplied to the Employer's Agent.

**PC 8.2.2 Installation of piezometers (pore pressure gauges)..... Unit : No**

The measurement shall be the amount of instruments installed, including the cables, splicing kits, numbers on cables and fastening systems used. The opening and the closing of trenches in the CVC for protecting the cable, the installation process and materials used for the installation (non shrink grout or bentonite and cement sealing material) shall be included in this measurement. Drilling of the

borehole shall be measured and paid for under Particular specification **Particular Specification: PI Drilling**.

**PC 8.2.3 Installation of temperature gauges..... Unit : No**

Measurement shall be the amount of instruments installed, including the cables, splicing kits, numbers on cables and fastening systems used. The opening and the closing of trenches in the CVC for protecting the cable, the installation process and materials used for the installation (non shrink grout or bentonite and cement sealing material) shall be included in this measurement. Drilling of the borehole shall be measured and paid for under **Particular Specification: PI Drilling**.

**PC 8.2.4 Installation of crack Width Gauges..... Unit : No**

The rate shall include for the supply and installation of the crack width gauges and the necessary stainless steel expanding anchors together with testing, calibrating, initial and daily readings and installation report.

**PC 8.2.5 Installation of temporary monitoring stations..... Unit : No**

Measurement shall be the number of temporary monitoring stations erected which are approved by the Employer's Agent. The measurement shall include the setting up of the monitoring station, the equipment used and the programming of the data logger.

**PC 8.2.6 Installation of permanent monitoring stations ..... Unit : No**

Measurement shall be the amount of permanent monitoring stations established. The measurement shall include the erection of the monitoring station, the equipment used and the programming of the data logger.

**PC 8.2.7 Installation of Hydrometeorological Station..... Unit: Sum**

The rate shall include the supply and installation of the hydrometeorological equipment as specified in **Clauses PC 3.9 and PC 5.9** and as shown on the Drawings.

**PC 8.2.8 Water level measuring equipment..... Unit: No**

The rate shall include for the supply and installation of the water level measuring equipment specified in **Clause PC 3.10** including accessories and consumables. Separate items will be scheduled for the different types of instruments.

**PC 8.2.9 Deflection beacons..... Unit: No**

The rate shall include for the supply and installation of the permanent deflection beacons, including all bronze base plates, bronze target holders, brass benchmarks and universal prism adaptors as specified in **PC 3.11**, including accessories and consumables. Separate items will be scheduled for the different types of instruments.

**PC 8.2.10 Monitoring..... Unit : No**

Measurement shall be the number of monitoring results supplied to the Employer's Agent.

**PC 8.2.11 Supply of computer system and software and delivery to the Employer..... Unit : No**

The rate tendered against the item in the Bill of Quantities shall include for full compensation of all costs incurred in the manufacture, procurement, inspection, testing of the Computer System and licensed Software including all necessary manuals (instruction manuals, data sheets and software licenses etc.), packaging and delivery to the Employer's Agent on site of the specified equipment.

Payment will be made per unit. Payment will only be effected after full compliance of the items with the Specification has been certified by the Employer's Agent.

**PC 8.2.12 Supervision of installation of instrumentation and equipment and testing....Unit : sum**

The rates tendered against the items in the Bill of Quantities shall include for full compensation of all costs incurred in supervision and testing of the installations including the provision of all labour, equipment, transport, materials and temporary works necessary to perform on-site quality assurance and quality control, inspection and testing of the unit in accordance with the Specifications. Payment will be made as a lump sum for all instruments, weirs, boreholes and cables. Payment will only be effected after full compliance of the items with the Specification has been certified by the Employer's Agent.

**PC 8.2.13 Tests on completion, operation, monitoring and reporting..... Unit: Sum**

Payment will be made per unit successfully Tested on Completion. Final payment will only be effected upon the issue of the Performance Certificate by the Employer's Agent. The rate tendered shall include for full compensation of all costs incurred in commissioning, operation, monitoring, taking of readings and reporting results to the Employer's Agent during construction, the filling period of the Dam and operation of the Dam during the Defects Notification Period.

**PARTICULAR SPECIFICATION: PD**

**STEEL PIPES**

**SCOPE**

This specification covers the design, manufacture and supply of bare, electric welded low carbon steel pipes, specials and other fittings for the conveyance of water at ambient temperatures and at medium pressures.

**PD 2 INTERPRETATIONS**

**PD 2.1 SUPPORTING SPECIFICATIONS**

PD2.1.1 Where this specification is required for a project, the following specifications shall form part of the contract document:

- (a) Project specifications;
- (b) SABS 1200A and SABS 1200AA, as applicable;

PD2.1.2 Reference is made to the latest issues of the following standards:

DWS 1131	Lining and coating of steel pipes and specials.
SABS 1200	As given in 2.1.
SABS 62	Steel pipes and pipe fittings up to 150 mm nominal bore, suitable for screwing to pipe threads.
SABS 1109	Electric welded low carbon steel pipes for aqueous fluids (ordinary duties).
SABS 719	Rubber joint rings (non-cellular).
SABS 974	Weldable structural steels.
SABS 1431	Corrugated Stainless steel piping systems for hot and cold water supplies.
SABS 1689	Welding.
SABS 044	Cathodic protection of buried and submerged structures.
SABS 0121	Steel pipes and specials for water and sewage.
BS 534	Class 1 arc welding of ferritic steel pipework for carrying fluids.
BS 2633	Compressed asbestos fibre jointing.
BS 2815	



BS	4360	Weldable structural steels.
BS	4416	Method for penetration testing of welded or brazed joints in metals.
BS	4504	Flanges and bolting for pipes, valves and fittings. metric series.
BS	5500	Specification for unfired fusion welded pressure vessels.
SIS	05 59 00	Pictorial surface preparation standards for painting steel surfaces (Swedish)
API	5L	Line pipe.
API	1104	Standard for welding pipelines and related facilities.
AWWA	June 1955	Design of wye branches for steel pipe.
AWWA	M11	Steel pipe - a guide for design and installation. (Second edition)
ISO	2084	Pipeline flanges for general use

**PD 2.2 APPLICATION**

This specification contains clauses that are generally applicable to the design, manufacture and supply of steel pipes, specials and fittings for duties up to 4,6 MPa. Should no other specification for pipes of outside diameter larger than 2 220 mm be included in a contract, then the requirements of this document shall apply.

**PD 2.3 DEFINITIONS**

For the purposes of this specification the definitions and abbreviations given in the applicable specifications listed in 2.1 and the following definitions shall apply:

Skelp: The jointing edges of steel coils used to manufacture spiral welded pipes.

H: The cross-sectional shape of a weld at skelp

Cut and shut bend: See definition with sketches in BS 2633

**PD 3 MATERIALS**

**PD 3.1 PIPES AND SPECIALS**

Materials used for the manufacture of pipes and specials of nominal bore up to 150 mm shall conform to SABS 62 and API 5L: steel grades up to X52, whilst that for pipes and specials of nominal bore over 150 mm shall conform to SABS 719: steel grades A, B and C, as well as API 5L: steel grades X46, X52, X56 and X60. Materials used for manufacture of Stainless steel pipes and specials of nominal bore of up to 200 mm shall conform to necessary SABS standards: grades up to 316L.

Flanges shall be manufactured from steel plates conforming to BS4360, or SABS 1431 grade 300W. Specials and fittings shall be manufactured from materials conforming to SABS 62 for nominal bores up to 150 mm, and to BS 534 for nominal bores over 150 mm.

**PD 3.2 RUBBER JOINT RINGS**

Rubber rings shall comply with SABS 974 Class F.

**PD 3.3 JOINTING MATERIALS**

Bolts, studs, nuts and washers for flanges shall be of materials conforming to the requirements of BS4504 unless otherwise specified. Gaskets for flanged joints shall be of compressed asbestos fibre to BS 2815 grade A, and full faced with a minimum thickness of 3 mm. For pressures up to and including 1,6 MPa, cloth-inserted rubber may be used.

**PD 4 PLANT**

The Contractor shall supply and maintain suitable tools, plant and equipment to manufacture and supply steel pipes, specials and fittings to the required standard.

**PD 5 GENERAL REQUIREMENTS**

**PD 5.1 DESIGN OF PIPES**

The design stress for pipes subjected to the specified design pressures shall be 60% of the minimum yield stress of the steel.

Unless otherwise specified in the Schedule of Quantities or on the drawings, the minimum pipe wall thickness to prevent buckling of straight piping due to internal sub-atmospheric pressures, shall not be less than 3mm :

**PD 5.2            DIMENSIONAL REQUIREMENTS**

Unless otherwise specified in the Schedule of Quantities or on the drawings, all line pipes shall be of one fixed standard length between 9 metres and 19,5 metres. Standard pipes from which samples for destructive testing have been cut may be jointed together by butt-welding to form single pipe lengths of the required standard length.

The tolerances on all other dimensions shall be in accordance with SABS 719 clause 4.1, except that for pipe outside diameters bigger than 1 250 mm it shall be +6 mm and 6 mm. The tolerances on the outside diameters of pipe ends and bodies shall be as specified for pipe diameters of 250 mm to 1 250 mm.

**PD 5.3            FABRICATION**

**PD 5.3.1        Welding**

Welds shall comply with SABS 719, SABS 044 and BS 2633 as modified below.

- a) Sections 1, 2 are excluded.
- b) Section 8

In addition to clause 8.1 the following shall also apply:

All butt-welds and branch fillet welds on specials shall where considered possible (refer clause 3.2.4.2, Section 3) have an internal weld. The weld bead of this internal weld shall not extend above the prolongation of the original inside surface of the pipe by more than 1,0 mm. Internal reinforcement in the form of backing rings at weld seams shall not be permitted.

- c) Section 10

Procedure qualification and qualifying tests shall be restricted to branch connections only.

The internal weld bead/upset metal and flash on the inner surface shall not exceed 1 mm. For pipes and specials to be jointed by butt welding, the internal weld bead shall not protrude more than 1 mm into the bore of the pipe or special. For electric resistance welded pipes, the height of upset metal and flash on the inner surface shall not exceed 1 mm. For pipes and specials to be jointed by butt welding, the internal weld bead shall be ground flush with the pipe body for a length of 200 mm from the ends to be jointed. For pipes and specials to be coupled by flexible couplings, external weld reinforcement or upset metal and flash shall be ground flush with the pipe body for a length of 200 mm from the end to be coupled.

Where automatic submerged-arc welding is employed, at least one pass shall be made on the inside and at least one pass on the outside. This shall apply for double jointing of pipes in the factory as well. The number of longitudinal weld seams shall not exceed:

- i) for pipes up to 1 000 mm nominal diameter.
- ii) for pipes larger than 1 000 mm and up to 2 220 mm nominal diameter.

For pipes to be jointed by flexible couplings the pipe manufacture is required to weld steel plates not less than 50 mm x 75 mm x 6 mm thick to each end of all pipes during the pipe manufacturing process, (i.e. before priming, lining and coating).

All manual or semi-automatic welds and repair welds shall only be undertaken by welders qualified under the tests laid down in the Code of Practice for Welding SABS 044.

**PD 5.3.2 Pipes**

Pipes shall be manufactured in conformity with SABS 719.

**PD 5.3.3 Specials and fittings**

**PD 5.3.3.1 General**

All specials and fittings shall be designed and manufactured by the Contractor in accordance with the general arrangement shown on the drawings and/or described in the Schedule of Quantities, in conformity with SABS 62 or sections 3 and 4 of BS534. In the latter case specials shall be manipulated or fabricated by welding from pipes which have been tested to SABS 719. Detailed drawings shall be approved by the Employer's Agent.

**PD 5.3.3.2 Bends**

Bends shall either be smooth formed or segmented. The maximum angle between oblique butt-ends of segments for gusseted bends shall not exceed 22½ degrees. Cut-and-shut bends shall not be permitted. Segmented bends shall be classified as short, medium and long with radii equal to one, two or three diameters respectively. All bends shall however be of a long radii type, unless otherwise specified in the Schedule of Quantities or on the drawings.

**PD 5.3.3.3 Branch connections**

Branch connections shall have barrel and branch plate thicknesses such that the maximum stress shall not be greater than that for an uncut pipe of the theoretically required minimum thickness. However, where it is more economical to provide external reinforcement in the form of saddle-type rings or triform shoes, these forms of reinforcement shall be used to achieve the same results. The attachment of reinforcement to the pipe branches shall be by full penetration welding. Branch connections shall be as remote as possible from the seam weld on the barrel, and except where specifically indicated to the contrary on the drawings, the positioning and extent of external reinforcement is to be determined by the following methods:

- (i) Saddle-type reinforcement: section 13.3 of AWWA Manual M11.
- (ii) Triform-shoe reinforcement: in accordance with "Design of Wye Branches for Steel Pipe" by H.S. Swanson and co-authors, published in the Journal of the AWWA, June 1955.

Scour valve tees are to be at right angles to the barrel of the pipe, but tangential to the circumference at the invert of the pipe. The flanges are to be aligned to suit the gradient of the pipeline as indicated on the drawings.

Unless otherwise specified complete flanged air valve and access branches shall be supplied loose with the one end profiled and prepared for welding to the pipe or special. Branches are to be realigned to suit the pipeline gradient as indicated on the drawings.

**PD 5.3.3.4 Reducers**

Taper pieces shall not have more than two longitudinal weld seams.

**PD 5.3.3.5 Flexible couplings**

Flexible couplings shall be of the Viking-Johnson type with centre register, except where specified to the contrary in the Schedule of Quantities or on the drawings. Flexible couplings shall be supplied complete with all necessary bolts, nuts and rubber jointing rings.

**PD 5.3.3.6 Insulated joints**

Insulated joints shall have their insulation material arranged as given in SABS 0121, unless otherwise specified.

**PD 5.3.3.7 Flanges**

Flanges shall be of the steel-plate for welding type and shall have flat joint faces, with dimensions and joint surfaces in accordance with BS 4504 or ISO 2084, unless otherwise specified in the Schedule of Quantities or on the drawings. For flange thickness not covered in BS 4504 and for domed and conical ends the various thicknesses and methods shall be calculated in accordance with section 3 and where applicable manufactured in accordance with the remainder of BS 5500. Back surfaces may be left unmachined. All flanges shall be suitable for field welding to pipes and specials and shall conform to BS 2633, section 7, with preparation of plate flanges as shown in figure 41 ("slip-on") for pipes and specials up to 100 mm N.B. and figure 39 or 40 ("bore and fillet") for pipes and specials 125 mm N.B. and larger. Unless otherwise specified, jointing material i.e. bolts, nuts and washers, in conformity with BS4504 shall be supplied by others.

**PD 6 MARKING OF PIPES AND SPECIALS**

All pipes and specials shall be clearly hard stamped alongside a longitudinal or spiral weld on one end of the pipe with the following:

- (a) grade and thickness of steel;
- (b) serial number of the pipe or specials;
- (c) nominal diameter;
- (d) hydraulic test pressure.

The applicable drilling table shall be stamped on the periphery of all flanges. Bends shall have their centre plane marked with two small punch marks close to both ends to facilitate correct positioning in laying.

**PD 7 STORAGE, HANDLING AND TRANSPORT**

Pipes and specials shall be protected against damage at all stages from manufacture to delivery. The ends of all pipes and specials shall be protected against denting. Pipes shall be transported and stacked in a manner such as to prevent deformation of the pipe body in excess of 2 percent of the diameter. Dents causing a protrusion in excess of 3 mm into the interior of the pipe shall be repaired by cutting out. The Contractor shall be responsible for dispatching and transporting of the pipes to site and off-loading. Suitable access along the pipeline route will be provided unless otherwise specified.

Access for delivery on site might be restricted by poor weather conditions and the Contractor shall make due allowance for such disruption. Unless otherwise specified the pipes shall be off-loaded adjacent to the laying position, and placed on sandbags or other approved protective supports.

As indicated on the drawings, the Contractor shall stack the pipes, specials and fittings at the top or bottom of very steep inclines from where the pipeline construction Contractor will transport them to their destination as required. He will furthermore provide in the rates for his delivery trucks to be hauled/towed up the steep inclines along the pipeline route where necessary.

**PD 8 INSPECTION AND METHODS OF TEST**

**PD 8.1 General**

Factory inspection, supervision of tests, and adjudication of test records shall be carried out by an independent Inspectorate appointed by the Employer to act on behalf of the Employer's Agent. Tests and inspections shall be carried out at the manufacturer's works at his expense. He shall provide all necessary testing facilities, labour, instruments, equipment and samples that might be required, free of

charge. The Inspectorate shall be afforded every facility during the course of manufacture and testing to enable the inspection to be carried out effectively. All test samples shall be selected by the appointed inspectors, and all instruments used for testing purposes shall be approved by the inspectors and if in their opinion any instrument should require calibration, such instruments shall be calibrated at the expense of the Contractor, by the SABS or other such body as may be approved by the Inspectorate. No mechanical working or straining of pipes and specials shall be allowed after testing and inspection.

**PD 9 MEASUREMENT AND PAYMENT**

Measurement and payment shall be per linear metre of straight pipe fabricated, supplied and delivered to site. Measurement and payment of specials and fittings shall be per the number of each special and fitting fabricated, supplied and delivered to site. Where pipe linings and coatings are applied prior to delivery, the rates for pipes, specials and fittings shall include for all such linings and coatings as required under Departmental Specification DWS 1131, unless otherwise specified in the Schedule of Quantities.



## PARTICULAR SPECIFICATION: PE

## VALVES

## PE 1 GATE VALVES

Gate Valves shall bear the official mark of SABS and be SABS approved. They shall comply with SABS 664 for waterworks pattern valves of the types, classes and sizes listed in the Schedule of Quantities and shall be provided with the following :

	Description	Specification
1	Flanges	Double flanged, to be in accordance with and drilled off-centre to SABS 1123, Table 1600, 2500 or 4000 as scheduled.
2	Spindles	Non rising, bronze or stainless steel with spindle nut either bronze or gunmetal
3	Handwheels	Direction of rotation for opening valves shall be clockwise when viewed from the top and appropriate wording must be embossed at the top indicating direction of "close" and "open" with arrow heads
4	Tests	Valves to be subjected to "closed end" and "open end" pressure tests to one and half times the working pressure. Valve body shall be tested to twice working pressure. Under all the tests, no leakage to occur
5	Paint	As in PD4
6	Other	<ul style="list-style-type: none"> <li>• Type B gunmetal trim</li> <li>• Valves should permit repacking of the gland whilst valve is under pressure</li> <li>• Factory test certificates to be provided with each valve</li> <li>• Rates in the schedule of quantities to include requirements to comply with specification</li> </ul>

## PE 2 REFLUX VALVES

Reflux valves shall, except where otherwise specified, be double flanged single door swing type and shall be fitted with gun metal seats and bronze hinge and clack pins. In the case of reflux valves to be mounted horizontally, the design shall be such that the gate rests against the seat in the absence of flow or of differential pressure, without the aid of springs or external counterweights. Reflux valves shall comply with the requirements of SABS 144 for working pressures as required for each application, but not less than 1600 kPa working pressure.

## PE 3 AIR VALVES

## PE 3.1 GENERAL

The materials and workmanship employed in the manufacture of air valves shall be of a similar standard to that set out in SABS 664 for waterworks pattern gate valves and they shall be provided with individual test certificates for each valve from the manufacturer; all valves are to be inspected, and the hydraulic tests witnessed, by an Inspector to be appointed by the Employer's Agent, and the tendered rates for the valves shall include for making arrangements for independent inspections. The Inspectors' fee and recoverable expenses will be for the account of the Employer, fees and expenses arising from abortive or repeat visits due to non-compliance with the specified requirements will be for the Contractor's account and will be deducted from amounts due to the Contractor.

PE 3.2 TYPES OF AIR VALVES

Air Valves shall be standard types (epoxy coated flanges; stainless steel sleeve, bolts, nuts, studs etc), of the double orifice type, and shall be equal or similar to the "Vent-O-Mat" (RBX series: 50 mm diameter valves: 050 RBXc2511; 80 mm valves: 080 RBXc1601) type in which a small orifice, manufactured from Grade 316 stainless steel and having a minimum orifice size of 2,0 mm diameter, shall be capable of releasing accumulations of air at all pressures throughout the specified working pressure range and shall be drop-tight at 0,5 Bar. The large orifice shall be suitable for admitting or expelling large quantities of air during emptying and filling of the pipeline. The opening of the valve (to atmosphere) shall be enclosed by a stainless steel mesh which has been fixed into the valve body to prevent the entry of small insects or vermin into the valve.

All welding of stainless steel shall be carried out in workshops dedicated to the fabrication of stainless steel products. Care shall be taken that the correct welding rods and approved welding procedures have been used for each application, and the Employer's Agent shall have the right to request a certificate from the manufacturer in which the weld procedures used for the manufacture of valves supplied are stated.

All welds and weld beads, internal and external, shall be smoothed down by grinding and buffing. All stainless steel shall be pickled and passivated before the valve is assembled and tested.

PE 3.3 TESTING

Each air valve is to be subjected to the following tests at the factory :

- (a) First, fill the valve with water and apply the factory test pressure through the inlet of the valve. Under this condition there shall be no weeping from any part of the valve.
- (b) Second, drain the valve and refill the valve with water and apply the maximum working pressure through the inlet of the valve and maintain for at least five minutes. Under this condition there shall be no loss of water from the valve.
- (c) Third, gradually reduce the pressure applied under (b) above to atmospheric pressure, empty the valve and refill slowly expelling the air through the valve until it is full of water. Raise the pressure to the minimum working pressure, maintain that pressure for at least five minutes and again there shall be no loss of water from the valve.
- (d) Fourth, maintain the minimum working pressure applied in (c) above, isolate the water inlet and introduce small amounts of compressed air into the valve without lowering the pressure in the valve. The lower float shall drop away from the upper float when sufficient air has accumulated in the valve. As soon as the accumulated air in the valve has discharged through the small orifice, the valve shall again close to a watertight condition. This process shall be repeated for at least five different pressures which are equally spaced between the specified minimum and maximum operating pressures, and the valve shall close automatically when all the air has escaped without any dribbling and shall have a drop-tight shut-off.



## PE 3.4 TABLE OF PARTICULAR REQUIREMENTS FOR AIR VALVES

Scheduled Items			
Nominal diameter (mm)		300	300/50
Class		25	16
Flange Size and Rating		SABS 1123 Table 2500	SABS 1123 Table 1600
Flange Drilling		SABS 1123 Table 2500	SABS 1123 Table 1600
Factory Test Pressure (metres head of water)		250	160
Field Test Pressure (metres head of water)		as for pipeline	as for pipeline
Working Pressure (metres head of water) :			
(a) Maximum		250	160
(b) Minimum		200	120

## PE 4 PAINTING OF VALVES

PE4.1 The cleaning and painting of valves as specified hereunder is to be carried out at the factory prior to despatch to site.

PE4.2 All cast iron surfaces of every valve shall be prepared for painting to a thoroughly clean condition free of all grease and deleterious matter. Steel surfaces shall be prepared in accordance with Swedish Standard SIS 05 5900 for a Sa 2.5 finish.

PE4.3 Internal surfaces shall then be treated with two coats of Copon Hicote 151E or other approved non-toxic epoxy resin paint to give a total minimum dry film thickness of 160 micrometres; both coats being applied within 48 hours of commencement of painting.

PE4.4 External surfaces shall, immediately after cleaning, be treated with one of the following alternative paint systems:

- (a) System 1 - for valves situated in underground chambers or exposed conditions.

Apply three coats of an approved epoxy coal tar paint to give a minimum total dry film thickness of 240 micrometres; all three coats being applied within 72 hours of commencing the first coat.

- (b) System 2 - for valves situated in pump stations etc.

Apply one coat of zinc chromate primer followed by one coat of undercoat tinted where necessary, and a final coat of best quality gloss enamel. The total dry film thickness of the system shall be not less than 200 micrometres.

PE4.5 Non-ferrous metal or stainless steel surfaces shall not be painted.

PE 4.6 After erection on site all valves shall be cleaned and the paint work refurbished where necessary to restore the condition to that at the time of leaving the factory.

PE 5

PAYMENT

The prices quoted for all valves are to include for independent factory testing of valves, which test will be witnessed by Inspectors appointed by the Employer's Agent.

**PARTICULAR SPECIFICATION: PF**

**WATERSTOPS, JOINING AND BEARINGS**

**PF 1 SCOPE**

This specification covers the requirements for the supply and installation of waterstops, joint fillers, sealants, and bearings required in various components of the Works.

**PF 2 INTERPRETATIONS**

**PF 2.1 SUPPORTING SPECIFICATIONS AND STANDARDS**

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

**PF 2.2 DEFINITIONS AND ABBREVIATIONS**

For the purpose of this specification the definitions and abbreviations given elsewhere in this document and the following abbreviation shall apply :

PVC : Polyvinyl Chloride.

**PF 3 MATERIALS**

**PF 3.1 GENERAL**

The Contractor shall submit to the Employer's Agent for his approval, full details of the materials proposed for incorporation into the Permanent Works, prior to delivery to site. These details should include name of manufacturer, place of manufacture, relevant catalogues and any other information such as test certificates and application specifications, which the Employer's Agent may request.

**PF 3.2 STORAGE OF MATERIALS**

All materials shall be stored in well-ventilated, weather proof buildings away from heat, oil and chemicals. The Contractor shall take particular care that rubber and PVC waterstops do not deteriorate due to prolonged exposure to sunlight.

**PF 3.3 WATER STOPS**

Rubber waterstops shall comply with the requirements of CKS 388 and be of the internal dumbbell or centre bulb type as shown on the Drawings. They shall contain not less than 70% natural rubber by volume, shall be precision moulded, and shall have the following properties at 20°C.

- Minimum tensile strength : 20,5 MPa
- Minimum elongation at breaking : 450%
- Hardness (Shore A as determined by BS 903) : 60-70
- Maximum water absorption by weight after 2 days at 70°C : 5%
- Minimum tensile strength after ageing (48 hrs at 70°C and 2,0 MPa of oxygen) : 75% of initial tensile strength

- Minimum elongation after ageing  
(48 hrs at 70°C and 2,0 MPa of oxygen) : 75% of initial elongation at break
- Maximum compression set by constant  
deflection method(%age of original deflection) : 20%

Right angles, tees junctions and other intersections shall generally be moulded as one unit by the manufacturer.

PVC waterstops shall comply with the requirements of CKS 389 and be of the internal dumbbell or centre bulb type (Hydrofoil) as shown on the Drawings. Right angles, tee junctions and other intersections must be fabricated in the manufacturer's workshops in properly constructed jigs to the approval of the Employer's Agent and shall have a minimum tensile strength of 12,6 MPa at 23°C. The PVC waterstops shall have the following properties.

- Minimum tensile strength : 16 MPa
- Minimum elongation at breaking : 250%
- Hardness (Shore A) : 70 – 90
- Maximum water absorption by weight after 2 days : 0,5%
- Resistance to Alkali  
(10% NaOH solution for 7 day test period)
  - Mass change : -0,10% to +0,25%
  - Hardness change : +/- 5 Shore A (max)
  - Tensile strength change : 15% (max)

The nominal size of the waterstop shall be as shown on the Drawings and given in the Bill of Quantities.

Waterstops shall be packed in the longest possible length that manufacture will allow.

Waterstops shall be provided with lugs or eyelets on the edges for positioning during concreting.

Prior to the waterstop being used in the Works, a certificate from the SABS indicating that the product the Contractor proposes to use has been tested and conforms to the above-mentioned requirements, shall be submitted to the Employer's Agent. The test certificate shall not be more than 3 months old.

### PF 3.4 JOINT SEALANTS

Joint Sealants shall be elastomeric sealants and comply with the requirements of SANS 110 for Type 2.

Polyethylene tape shall be used where bond breakers are required. Backup materials shall be cork filler or other material compatible with the sealant used. Where a primer is to be used in conjunction with the sealant, it shall be of the prescribed proprietary material. The colour of all sealants used on the Works shall be grey.

Other joint sealants may be used if approved by the Employer's Agent after submission of full specifications and information by the Contractor.

### PF 3.5 BEARINGS

Bearings shall be either elastomeric laminated bearings complying with the requirements of BS 5400 (Sections 9.1 and 9.2.) or proprietary bearing strips as shown on the Drawings.

The bedding material for seating of elastomeric bearings shall be sand : epoxy resin mortar with a cured compressive cube strength of 20MPa.

Other types of bearings may be used if approved by the Employer's Agent after submission of full specifications and information by the Contractor.

**PF 4 PLANT**

**PF 4.1 WATER STOPS**

All the necessary equipment as specified by the suppliers of waterstops for cutting and jointing shall be provided on Site. Intersection pieces made on Site shall only be done with equipment specified and approved by the supplier.

**PF 4.2 ELASTOMERIC SEALANTS**

Equipment as specified by the supplier shall be used for mixing, preparation and application of elastomeric sealants on Site.

**PF 4.3 BEARINGS**

No special equipment is required for the installation or seating of bearings unless specified by the manufacturer.

**PF 5 CONSTRUCTION**

**PF 5.1 WATER STOPS**

**PF 5.1.1 General**

Immediately prior to commencing concreting, all waterstops shall be thoroughly cleaned of all dirt or other contaminants. Waterstops on which grease or oil has been spilled, shall not be used in the Works. In general all waterstops shall be installed in accordance with the manufacturer's instructions.

**PF 5.1.2 Fixing Waterstops**

Where a waterstop is to be installed in a formed face, the split formwork method shall be adopted. The Contractor will not be allowed to bend the waterstop at right angles into the initial pour and then unbend it for the subsequent pour. The formwork on either side of the waterstop must be designed and erected to ensure a grout tight joint. The waterstops shall be installed securely to ensure there is no movement prior to or during concreting. The waterstop shall be pulled tight by means of wires through the eyelets on the edges of the waterstops, such that no displacement takes place during concreting. Under no circumstances shall any waterstop be nailed into position or any perforation be made into the waterstop.

**PF 5.1.3 Protection of Waterstops**

The Contractor's attention is drawn to the fact that rubber and PVC waterstops deteriorate when exposed to sunlight for prolonged periods. Protective measures shall therefore be adopted for sections of waterstops that may be so exposed. If, in the opinion of the Employer's Agent, a waterstop has deteriorated due to the Contractor's negligence in this regard or has otherwise been damaged, the affected section of waterstop shall be replaced in accordance with the Employer's Agent's instructions, at the Contractor's expense.

**PF 5.1.4 Jointing Waterstops**

Rubber waterstops shall be joined using the hot vulcanising method. The joint shall be prepared and made strictly in accordance with the manufacturer's instruction and using special equipment available for this purpose.

PVC waterstops shall be joined using the heat welding method which shall be carried out strictly in accordance with the manufacturer's instruction.

PVC waterstops must be easily joined on site by heating the ends. The resultant joint must have a minimum strength of 11,2 MPa in tension at 23°C. Full details of recommended jointing procedures and special tools required are to be supplied to the Employer's Agent for approval before any orders for supply of these waterstops is placed.

Where jointing is to be performed in a confined area, forced ventilation shall be provided to remove fumes generated by the jointing process.

#### **PF 5.1.5 Placing Concrete**

Particular care shall be taken when placing concrete around waterstops. The Contractor shall ensure that the concrete is adequately vibrated and no voids are left around the waterstop.

Large size aggregates exceeding 38mm shall be removed by hand from the concrete in the immediate vicinity of the waterstop during concreting.

#### **PF 5.2 Applying Joint Sealants**

The grooves shall be dry and cleaned by rigorous wire brushing until all dirt, laitance and dust or any foreign material have been removed. Where oil or grease has been spilled in the grooves, it shall be cleaned in accordance with the manufacturer's requirements. Edges of the grooves which have been damaged during the construction process shall be rectified as directed with an approved epoxy mortar of similar colour as the concrete and compatible to the joint sealant and approved by the Employer's Agent.

The sealant, backup materials, bond breaker and primer shall be applied strictly in accordance with the manufacturer's specifications.

The joint sealant shall be tooled to a smooth finish flush with the surrounding concrete surfaces.

The concrete surfaces immediately adjacent to the groove shall be covered with marking tape before priming and removed immediately after the sealant is tooled to produce a neat finish.

#### **PF 5.3 Bearings**

Elastomeric bearings shall be placed accurately to line and level on a 20mm thick sand: epoxy resin mortar seating, neatly finished off around the edges.

Bearing strips (e.g. along the top of a concrete wall) shall be laid without bedding on the concrete surface. The unformed surface finish of the concrete on which the strip is laid, shall have been finished off as required for a Class U3 finish in terms of Subclause P32.5.5.14 of Particular Specification P32. Uneven concrete surfaces shall be rectified with sand : epoxy resin mortar as directed by and to the approval of the Employer's Agent.

The spaces around the bearings and along the edges of a bearing strip may be filled with high density polystyrene for concreting and shall be raked out and blown out when the formwork is removed. Extreme care shall be taken not to disturb the bearings during concreting.

#### **PF 6 TOLERANCES**

The tolerances as specified in Particular Specification P32 shall apply.

#### **PF 7 TESTING**

The materials supplied shall be tested as the Employer's Agent may order.

**PF 8 MEASUREMENT AND PAYMENT**

**PF 8.1 Basic principles**

Formwork and forming of grooves shall be measured and paid for as provided in **PSG Concrete (Structural)**.

Waterstops will be measured by length and no separate measurement will be made for intersection pieces or jointing of the waterstops. Measurement of the length of waterstops will be made from or to the centre point of intersection pieces.

**PF 8.2 Scheduled Items**

**PF 8.2.1 Waterstops..... Unit : m**

Distinction shall be made between different types of material, type and sizes of waterstops.

The rate shall cover the cost of supply, installation, jointing and intersection pieces, as well as the additional measures required during concreting.

**PF 8.2.2 Protection..... Unit : m**

The rate shall cover the cost of installation and removal of the protection to the waterstops exposed in the diversion system waterway.

**PF 8.2.3 Joint sealants..... Unit : m**

Distinction shall be made between different sizes and types of grooves to be sealed. The rate shall cover the cost of supplying, making good of damaged groove edges, back up where required, bond breaker, primer, joint sealant and the finishing off of the sealed joint.

**PF 8.2.4 Bearings..... Unit : No or m**

Distinction shall be made between different types of bearings. The rate shall cover the cost of supply, seating in a bedding of sand : epoxy resin mortar and the filling of spaces around the bearing required for casting the superstructure and the cleaning out of the spaces.

**PARTICULAR SPECIFICATION: PG**

**LANDSCAPING AND VEGETATING THE SITE**

**PG 1 SCOPE**

This specification covers the requirements for the landscaping of designated areas of the Site, the establishing of grass for functional purposes on the downstream face of the dam wall where applicable and designated environs, in designated areas of disused borrow pits, on designated soil dumps, on other designated cut and fill slopes and any landscaped and other areas shown on the Drawings or designated by the Employer's Agent. It covers landscaping of the Site, procurement, placement and preparation of topsoil, testing and fertilisation of topsoil, collection of seeds, provision of vegetation suitable for transplanting, establishing vegetation by sowing seeds by various methods and by transplanting of vegetation, quality control of materials and workmanship, watering and otherwise maintaining the vegetation and the reinstatement and finishing of surfaces.

This specification includes for disposal of trimmed material and cleaning of the sites upon completion of the landscaping and vegetation.

Bulk earthworks for shaping as part of landscaping to specified contours and forms is not included as part of this specification.

**PG 2 INTERPRETATIONS**

**PG 2.1 SUPPORTING SPECIFICATIONS AND STANDARDS**

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

**PG 2.2 DEFINITIONS AND ABBREVIATIONS**

For the purposes of this specification the definitions and abbreviations given elsewhere in this document and the following shall apply :

Acceptable Grass Cover. An acceptable grass cover shall have at least 75% of the area planted or seeded covered with live grass and no bare patches of more than 500mm in maximum dimension. In the case of grass established by grass sods the full area shall be covered with live grass.

Container plants. Container plants include all vegetation supplied by nurseries in temporary containers or all vegetation lifted from their natural position and transplanted into temporary containers suitable for transport to their final position.

Establishment of Grass and Plants. All procedures necessary to produce acceptable cover of grass or to successfully transplant trees and shrubs.

Establishment Period. The establishment period is the 3-month period commencing immediately after actual planting of the vegetation, provided that an acceptable cover of grass is established and that the trees or shrubs have taken root, as the case may be.

Hydroseeding. To apply seed in a slurry with water and other materials to enhance growth by means of pressurised spraying equipment.

Maintenance Period. The maintenance period shall be of the same duration as the Defects Liability Period for the Contract and shall coincide with the Defects Liability Period for the whole of the Works, provided that the establishment period has expired before the commencement of the Maintenance Period.



Natural Vegetation. Natural Vegetation includes all exotic and indigenous trees, shrubs, creepers, grasses and other plants growing on the Site.

Nursery Conditions. These are the conditions necessary to maintain healthy growth of container plants and include adequate protection against wind, frost, direct sunlight, pests, diseases and droughts and the provision of adequate supplies of water and fertiliser and any other measures necessary to maintain container plants.

Scarifying. To roughen the surface of the soil as a preparation for seeding.

Trimming. To neatly level or form existing or previously shaped earthworks to blend in with other earthworks, structures, drains or natural land forms.

Waiting Period. This is the period after applying fertilisers such as superphosphate before any grassing or planting can be commenced.

Weeds. Any declared weeds as well as any tree, shrub, herb, water plant or any other plant which, in the opinion of the Employer's Agent may pose any problems in specified areas at certain times and is therefore regarded as being undesirable.

### **PG 3 MATERIALS**

#### **PG 3.1 APPROVAL OF MATERIALS**

The Contractor shall supply in good time to the Employer's Agent the results from a laboratory approved by the Employer's Agent of the tests to be performed on the proposed topsoil in terms of this specification and the proposed types and dosages of fertilisers to be added to the topsoil, and to the seeding slurry in the case of hydroseeding, for prior approval by the Employer's Agent. Details of the proposed seed sources and types of seed, and the proposed nurseries or sources of supply of shrubs, trees, grass sods and grass cuttings shall be submitted to the Employer's Agent for approval.

#### **PG 3.2 TOPSOIL**

Topsoil shall consist of fertile loamy soil obtained from excavations for the dam, access roads and borrow pits for earthworks to be cleared or excavations for other structures. Preference shall be given to obtaining topsoil for grassing or landscaping from areas with a good soil coverage of natural vegetation, preferably grasses. Ideally topsoil shall be comprised of 15% to 25% clay (particle sizes less than 0,002mm), up to 10% silt (particle sizes between 0,002mm and 0,060mm) and 65% to 75% fine and medium sand (particle sizes between 0,060mm and 0,60mm) and shall have a pH of between 6,0 and 7,0. Topsoil shall be free of deleterious salts and other matter such as large roots, stones larger than 25mm, refuse, stiff or heavy clays and the seeds of weeds, which could adversely affect its suitability for the grass being planted. Topsoil for use in the Works shall not be stripped, collected or deposited while wet.

Topsoil removed from other portions of the Works shall immediately be deposited in final position to the extent possible, failing which the topsoil required for the Works shall be conserved and stockpiled as approved by the Employer's Agent. Topsoil to be conserved shall be stockpiled by dumping in separate heaps not exceeding 2m in height and in such a manner as to minimise leaching. Compaction of the stockpiled or placed topsoil shall be prevented.

#### **PG 3.3 FERTILISER AND SOIL-IMPROVEMENT MATERIALS**

The type of fertiliser and/or soil-improvement material to be used to meet the specified requirements shall be one or more of the following types unless otherwise indicated in the Project Specifications or otherwise ordered by the Employer's Agent :

- a) Fertilisers such as limestone ammonium nitrate, 2:3:2(22) and 3:2:1(25);
- b) Soil-improvement materials such as dolomitic lime, basic slag, gypsum, superphosphate and agricultural lime; and
- c) Trace elements

#### **PG 3.4 GRASS SEEDS**

Unless otherwise specified only fresh certified commercial seed shall be used and the types of seeds in the seed mixture shall be as indicated in the Project Specifications or on the Drawings or as approved by the Employer's Agent. Only grass seeds of pioneer and climax grasses indigenous to the area shall be used. Grasses shall not exceed 800mm in height when fully grown and shall be of species eminently suited to preventing erosion of the areas to be grassed and shall not require irrigation after the grass has been established. Selected species shall be of a type that has a habit of forming runners and not tufts.

Mixing the grass seeds of the various specified or approved species shall be performed on Site in the prescribed or approved proportions and to the approval of the Employer's Agent. The Contractor shall ensure that the grass seeds are stored in well ventilated dry areas at least 300mm above the floor of the storage shed.

Where grass seeds are to be collected by baling, the grass shall be cut and baled as soon as the seeds have developed fully and the grass has dried off and is also not wet from rain or dew. Where baled grass is stored the bales shall be stacked on well drained sloping ground in such a manner as to present minimal exposure to rain. Bales shall be harvested from approved areas of or in proximity to the Site where suitable climax and/or pioneer species are found.

#### **PG 3.5 GRASS CUTTINGS**

Grass cuttings for areas to be established with grass by planting shall be fresh and of the species indicated in the Project Specifications or on the Drawings or approved by the Employer's Agent. The grass species shall be proven to be suitable for use under the specified applications and under the climatic conditions prevailing at the Site and shall be eminently suited to preventing erosion of the areas to be grassed and shall not require irrigation after the grass has been established. Grass cuttings shall have sufficient root material to ensure good growth.

Grass cuttings shall be planted within 36 hours of having been harvested. All grass cuttings shall be kept in a moist condition and be protected from direct sunlight until time of planting.

#### **PG 3.6 GRASS SODS**

Grass sods for areas to be established with grass by means of sods shall be of the species indicated in the Project Specifications or shown on the Drawings or approved by the Employer's Agent and shall be either nursery-grown or veld sods as described below. The grass species shall be proven to be suitable for use under the specified applications and under the climatic conditions prevailing at the Site and shall be eminently suited to preventing erosion of the areas to be grassed and shall not require irrigation after the grass has been established. Grass sods shall be free from weeds and diseases. Sods obtained from nurseries shall be in moist soil not less than 30mm deep and sods obtained from the veld shall be in moist soil not less than 50mm deep.

- a) Nursery-grown sods. The grass shall have been grown specifically for sod purposes, mown regularly and cared for to provide a uniformity to the approval of the Employer's Agent. The sods shall be harvested by special machines manufactured for this purpose to ensure an even depth of cut with sufficient soil and root material.

- b) Veld sods. These sods shall be harvested from approved areas of or in proximity to the Site where a suitable species and density of grass and type of soil are found. The sods shall be harvested by special machines manufactured for this purpose to ensure an even depth of cut with sufficient soil and root material.

### **PG 3.7 TREES AND SHRUBS**

Plants shall be of the species indicated on the Drawings or in the Project Specifications or as ordered by the Employer's Agent.

Plants shall have been grown by a nursery approved by the Employer's Agent and shall be shapely, well rooted, healthy and free from insect pests and diseases. Roots shall not show any signs of having been restricted or deformed at any time.

Each plant shall be handled and packed in the approved manner for that species in containers in good condition and the Contractor shall take all the necessary precautions to ensure that the plants are delivered to the Site and thereafter to the final points of planting in a proper condition for successful growth. Vehicles used for transporting plants shall be adequately enclosed to protect the plants from windburn.

Unless planted immediately, all plants shall be kept, watered and fertilised under nursery conditions to the approval of the Employer's Agent.

### **PG 3.8 REVEGETATION CYLINDERS**

Revegetation cylinders shall consist of cylindrical capsules approximately 125mm diameter and 1 500mm long, manufactured from extruded plastic netting or similar approved biodegradable material. The plastic shall be designed to afford protection against the ultraviolet rays of the sun and shall be sufficiently robust to last for a period of not less than 3 years under normal service conditions, without disintegration.

The revegetation cylinders shall be filled with shredded partly compressed cubiformed organic matter such as wood chippings. Where wood chippings are used only material passing a 25mm square mesh sieve and retained on a 5mm square mesh sieve and free of splinters and flat chippings shall be used. The wood chippings shall be treated with an approved wood preservative such as Tanalith C.

### **PG 3.9 COMPOST AND MANURE**

Compost and manure shall be as approved by the Employer's Agent and shall be free of weed seeds, dust, soil or other deleterious or undesirable materials.

Compost shall be well decayed and friable.

Manure shall be pure manure unless otherwise approved and shall be free of any particles larger than 50mm in maximum dimension.

### **PG 3.10 MULCH**

Mulch shall be organic material to the approval of the Employer's Agent applied to the surface or worked into the soil in areas where vegetation is to be established, to add organic matter to the soil or as erosion protection.

Mulch may be applied by hand or hydroseeder.

Mulch for hand application shall consist of natural sun-dried plant fibres such as hay, chaff and tall grass cuttings variously between 50mm and 300mm long. This mulch shall be delivered to site in labelled plastic bags or bales.

Mulch for hydroseeding shall consist of a mixture of cellulose pulp and natural sun-dried plant fibres variously between 5mm and 25mm long and shall be capable of dispersing rapidly when mixed in water and shall also be capable of forming, after application, an absorptive mat that will allow moisture to penetrate into the underlying soil. The mulch for hydroseeding shall be free of weeds or other foreign matter and shall not contain any growth or germination inhibiting substances. This mulch shall be dry and shall be delivered to Site in labelled plastic bags also marked with the net mass of the mulch.

### **PG 3.11 ANTI-EROSION COMPOUNDS**

Unless otherwise specified anti-erosion compounds shall be as approved by the Employer's Agent and shall consist of a plastic material that can be sprayed onto the soil to act as a binder that will afford erosion protection.

Where bituminous anti-erosion compounds are specified these shall comply with the relevant requirements of :

SANS 309 Anionic bitumen road emulsions.

The emulsion shall be of the stable mix type and the bitumen base used for the manufacture of the emulsion shall be 150/200 penetration grade bitumen that complies with the relevant requirements of :

SANS 307 Penetration grade bitumens.

### **PG 4 PLANT AND EQUIPMENT**

All plant and equipment shall be to the approval of the Employer's Agent and shall be of adequate capacity and suitable for performing the work and shall be supplied and maintained in good working order by the Contractor.

Grass planters shall plant grass seeds in rows not more than 250mm apart, approximately 6mm deep and shall lightly compact the soil after the seeds have been planted.

Hydroseeding equipment shall be of a design that will not damage the seeds and that will ensure that the materials in the hydroseeding mix are uniformly dispersed and uniformly applied.

Watering equipment shall be capable of supplying adequate, but not excessive pressure to apply the water to the surface of the soil as a fine spray that will not compact the soil and at a rate sufficiently slow to ensure complete absorption by the soil without surface runoff.

Power lawnmowers shall be of either the rotary or drum type and shall be capable of cutting the grass cleanly without damage. The cutting blades shall be regularly sharpened.

### **PG 5 CONSTRUCTION**

#### **PG 5.1 LANDSCAPING**

##### **(a) Shaping**

Areas requiring shaping involving bulk earthworks shall be excavated, filled, compacted where specified and shaped to the contours and forms shown on the Drawings and to the tolerances specified in **Clause PG 6** of this specification. Such work shall be regarded as being earthworks executed as part of the relevant earthworks specification. Shaping shall include the restoration of the sites of the Temporary Works.

##### **(b) Trimming**

Trimming shall consist of bringing the existing or previously shaped ground to an even surface with the lines and levels generally following the original surface and to the tolerances specified in **Clause PG 6** of this specification. In the case of embankments and excavations constructed as part of the Contract, the trimmed surfaces shall be to the applicable tolerances specified in the relevant specifications.

Where machine operations are not practicable trimming shall be done using hand tools. When trimming slopes steeper than 1 in 3, the work shall be performed parallel to the contours. Besides trimming the surfaces of excavations and embankments constructed as part of the Contract, trimming shall only be performed to restore the sites of the Temporary Works and where shown on the Drawings or ordered by the Employer's Agent. Trimming of natural rock outcrops will not be ordered.

Trimmed surfaces shall be left slightly rough to facilitate binding with topsoil or the natural establishment of vegetation. During trimming all surface stones with a maximum dimension in excess of 30mm in areas to be grassed and in excess of 50mm in other areas and all other excess material shall be removed and disposed of in the designated spoil areas.

Areas to be grassed that are adjacent to concrete or stone paving, kerbing or channelling shall be trimmed to the appropriate lines and levels to ensure that after cultivation and the application of topsoil the finished surfaces shall be 25mm below the tops of the adjacent paving, kerbing or channelling.

Trimming shall be regarded as being earthworks executed as part of the relevant earthworks specifications.

## **PG 5.2 PREPARING AREAS FOR GRASSING**

The various areas to be grassed shall be prepared as set out hereinafter. After an area has been prepared for grassing, the grassing shall be completed before crustification.

- a) Areas which do not require topsoil.

Where the area to be grassed consists of suitable material it shall be scarified to a minimum depth of 75mm with furrows spaced between 250mm and 300mm apart. Scarifying shall be performed parallel to the contours, forming horizontal terraces. All loose stones with a maximum dimension in excess of 30mm shall be removed from areas designated to be mowed by machine and all loose stones with a maximum dimension in excess of 150mm shall be removed from other areas and be disposed of in the designated spoil areas.

- b) Areas which require topsoil.

Where areas to be grassed consist of unsuitable material which, in the opinion of the Employer's Agent, cannot be improved sufficiently to support good plant growth by the addition of soil amendments, the surface shall be lightly scarified to a depth of 30mm to ensure a proper bond between the topsoil and the subsoil.

Topsoil shall be placed on the shaped and prepared surfaces, compacted lightly to a firm surface to reduce the risk of erosion and be trimmed to the thicknesses indicated on the Drawings or ordered by the Employer's Agent. The topsoil shall be scarified to an average depth of 10mm by means of handraking parallel to the contours and all stones removed as specified in paragraph (a) above for areas not requiring topsoil. The topsoil shall be moist over the entire depth, up to a maximum depth of 300mm, while being worked prior to fertilising and seeding.

- c) Fertilising

The Contractor shall have the top 150mm of the prepared surfaces tested in accordance with the requirements specified in **Clause PG 7** of this specification to determine the type and quantity of

fertiliser required for establishing proper growth conditions for the grass. The Contractor shall submit his proposals for fertilising to the Employer's Agent for prior approval.

Unless hydroseeding is to be employed, fertiliser shall be evenly applied prior to trimming over all the surfaces where grass is to be established and shall be thoroughly worked into the soil to the full depth of the topsoil, up to a maximum depth of 150mm. Mixing of the fertiliser and the soil shall be performed either manually or mechanically, to the approval of the Employer's Agent, and shall be completed within 12 hours after application of the fertiliser. Where hydroseeding is to be employed the fertiliser shall be included in the hydroseeding mix.

### **PG 5.3 GRASSING**

The method of establishing grass shall depend on the circumstances relating to each case and shall be as specified or directed by the Employer's Agent.

Immediately after grassing the Contractor shall water the grassed area and thereafter it shall be kept well watered for proper establishment and maintenance of the grass. The Contractor shall also take measures to the approval of the Employer's Agent to prevent erosion of the grassed areas.

Provision is made in this specification for the following methods of grassing :

a) Planting Grass Cuttings.

The areas to be grassed shall, unless wet, be thoroughly watered before the cuttings are planted to ensure that the soil will be uniformly wet to a depth of at least 150mm when the planting is done.

The grass cuttings shall be evenly planted by hand or mechanically at a rate of at least 70 grain bags of cuttings per hectare. Only fresh cuttings shall be used and no grass cuttings that have been allowed to dry out shall be used. Immediately after having been planted, and having been given a copious watering, and, when sufficiently dry, the grass cuttings shall be rolled with a light agricultural roller.

b) Sodding

Areas to be grassed by sodding, shall be trimmed to the required lines and levels, raked or spiked to give a loose surface for a depth of at least 40mm and, unless otherwise ordered by the Employer's Agent, be covered with a layer of topsoil, approved by the Employer's Agent, at least 75mm thick.

The areas to be sodded shall be thoroughly watered beforehand so that they will be wet to a depth of at least 150mm during sodding. The surface shall be roughened slightly to ensure a good penetration of roots into the soil. Sods shall be protected against drying out and kept moist from the time of harvesting until they are finally placed.

The first row of sods shall, where possible, be laid in a straight line, and if on a slope, laying the sods shall start at the bottom of the slope. The sods shall be butted tightly against each other, and care shall be taken not to stretch or overlap the sods. Where a good fit cannot be obtained any intervening spaces shall be filled with parts of sods or topsoil. The next row shall be similarly placed tightly against the bottom row with staggered joints until the entire area has been covered with sods. On steep slopes the sods shall be held in position by sufficient wooden stakes approximately 300mm long by 20mm thick.

The Contractor shall water the sods directly after placing to prevent undue drying out. As sodding is completed each section shall be lightly rolled before being thoroughly watered.

c) Hydroseeding

Cellulose pulp shall be added to the hydroseeding mix at a rate of 25kg of pulp per kilolitre of water used, unless otherwise ordered by the Employer's Agent in respect of flat slopes. Hydroseeding shall be carried out with the hydroseeding machine at a rate of application on not less than 38kg of seed mixture per hectare, unless otherwise specified in the project specifications or otherwise ordered by the Employer's Agent.

When the use of an anti-erosion compound is required such compound shall be applied simultaneously with the hydroseeding and shall be mixed with the hydroseeding mixture before application. In such cases the quantity of cellulose pulp shall be decreased by between 30% and 50%, as approved by the Employer's Agent, and depending on the quantity of anti-erosion compound being added.

d) Seeding

The Contractor shall water the area to be seeded to a depth of at least 300mm before commencing seeding.

When seeding by hand, the seed mixture and fertiliser, if any, shall be mixed and halved and be applied at the application rate approved by the Employer's Agent in two successive applications in which the second application follows immediately after the first application.

When seeding with a grass planter the fertiliser, if any, may be distributed simultaneously with the grass seed at the application rates approved by the Employer's Agent for both the grass seeds and the fertiliser.

Immediately after seeding the Contractor shall lightly roll or compact the seeded area to firmly embed the seeds, which shall not be covered by more than 6mm of soil.

When grass is to be planted in areas by means of natural grass seeds collected by baling the bales shall be broken and broadcast over strips or areas indicated on the Drawings or ordered by the Employer's Agent. The spreading density shall be to ensure a full cover of the soil to be grassed by cut grass to the approval of the Employer's Agent. After the grass has been broadcast the grass shall be harrowed to give it a light soil cover. No watering will be required.

e) Revegetation cylinders

The revegetation cylinders shall be installed in accordance with the manufacturer's instructions and shall be placed end to end in rows along the contour lines of the slope, as directed by the Employer's Agent. The spacing of rows shall be as shown on the Drawings and the cylinder ends shall be staggered in alternate rows to prevent runnels from forming. Revegetation cylinders shall be secured at their ends and in the middle, to barbed wire stays running down the slope, by means of special wire ties supplied by the manufacturers and using a suitable wire-tying tool.

The stay wires shall be secured to the slope by means of steel stakes and shall be pulled taut. The steel stakes shall be driven in sufficiently deep so as not to be dislodged when the topsoil is placed. The slope face shall preferably not be smooth but kept slightly rough to facilitate the better retention of the topsoil.

After the revegetation cylinders have been placed and secured in position, the space between rows shall be filled with an approved topsoil, the upper surface of which shall be finished flush with the tops of the revegetation cylinders. For this purpose the use of rakeshaped wooden tools is recommended. Care shall be taken during construction not to compact the topsoil excessively or to damage the cylinders when topsoil is moved down the slope. On slope sections wider than 10m, special precautionary measures shall be taken to protect finished work, such as using metal chutes or plastic sheeting for moving the topsoil down the slope. All topsoiling shall start from the top of the slope.

#### **PG 5.4 ESTABLISHING AND MAINTAINING THE GRASS**

All sodded and grassed areas shall be adequately watered at regular and frequent intervals to ensure the proper germination of seeds and growth of grass until the grass has established an acceptable cover and thereafter until the beginning of the maintenance period of the grass. The quantity of water and the frequency of watering shall be subject to the approval of the Employer's Agent. With hydroseeding the commencement of watering may be postponed until a favourable time of the year, but watering shall commence and continue as soon as the seeds have germinated and growth has started.

Weeds shall be controlled continuously by means approved by the Employer's Agent.

Where deemed necessary to promote adequate coverage the Contractor shall mow or cut all grassed areas during the maintenance period at intervals approved by the Employer's Agent. All grass cuttings shall be collected and disposed of to the approval of the Employer's Agent. Established grass shall be cut to a height of 25mm above finished ground level. Initially the height of cut shall be 50mm above finished ground level in grassed areas established other than by sods, the height of cut being reduced gradually to 25mm only when adequate cover has been attained. Approved methods such as the use of scythes or brush cutters shall be employed to cut the grass where mechanical mowing is impractical.

Any bare patches where the grass has not taken or where it has been damaged or has dried out shall be recultivated, planted, sodded or hydroseeded by the Contractor at his own expense.

All grassed areas shall have an acceptable grass cover at both the beginning and the end of the maintenance period for the grass.

#### **PG 5.5 TREES AND SHRUBS**

##### **a) Positions**

Trees, shrubs and individual plants shall be planted in the positions indicated on the Drawings or ordered by the Employer's Agent.

##### **b) Preparing Plant Holes**

Unless otherwise directed by the Employer's Agent all plant holes shall be square and be prepared as set out hereinafter. Holes shall be 5 times wider than the plant container or root ball and 1,5 times deeper than the container or root ball, provided that holes for the trees shall not be less than 600mm wide and 900mm deep and holes for shrubs shall not be less than 500mm wide and 600mm deep.

The Employer's Agent shall direct the Contractor where impenetrable shale, rock or clay or a water table is detected immediately below the holes, the presence of which shall be reported to the Employer's Agent by the Contractor.

Where the local soil has poor drainage, a 150mm thick layer of crushed stone shall be placed in the bottom of the hole before it is filled with soil.

Each plant hole shall be refilled with selected and approved topsoil thoroughly mixed with one heaped spadefull of manure or compost and the necessary type and quantity of fertiliser determined from the results of the soil tests. Holes shall be thoroughly watered and an approved ant and termite killer shall be added to each hole before planting.

##### **c) Planting Nursery Grown Plants**

The plants shall be well watered by the Contractor before they are removed from their containers for planting. As much of the soil from the container as possible shall be retained around the roots of the



plant during planting, taking care not to damage any roots. The refilled plant hole shall cover all roots and the soil shall be pressed down well to be at the same level as the surrounding in situ soil.

Directly after having been planted each plant shall be well watered in order to settle the soil. After the soil has settled, additional soil shall be added as necessary to bring the replaced soil in the hole to within 150mm of the surrounding in situ soil to ensure that sufficient water can be retained around the plant. After planting the soil around the plant shall be covered with mulch and be copiously watered.

d) Transplanting Natural Vegetation

Natural trees and shrubs ordered by the Employer's Agent to be transplanted shall be transplanted as described hereinafter. Unless otherwise ordered, natural vegetation to be transplanted shall not be taller than 1,5m and transplanting shall only be performed during the winter when the plants are dormant and before any new leaves appear.

The plants shall be carefully removed from the soil so as to leave a large ball of soil attached to the roots to avoid damage to and disturbance of the roots, as approved by the Employer's Agent. The root ball shall immediately be wrapped in a hessian or plastic cover to ensure that the soil is retained. The plant shall be lowered into the plant hole and all plastic shall be carefully removed before filling the hole with soil. In the case of a hessian cover around the root ball it is only necessary to loosen the cords holding the hessian in place before filling the hole with soil. Before the hole is filled with soil the plant shall be staked in accordance with this specification. The backfilled soil shall be firmly pressed down around the plant and be brought up to within 150mm of the surrounding in situ soil to ensure that sufficient water can be retained around the plant. After planting the soil around the plant shall be covered with mulch and be copiously watered. Where plants cannot be transplanted immediately and must be temporarily transferred to containers this shall be performed to the approval of the Employer's Agent.

e) Anchoring of Plants

After planting all trees shall be tied to three cresoted timber stakes firmly planted in the ground. The stakes shall be 300mm longer than the planted tree and shall be placed at least 500mm apart and away from the trunk and roots of the tree so as not to damage the roots, as approved by the Employer's Agent.

The tree shall be tied to each stake by means of three binding wire loops sheathed in a flexible 20mm diameter PVC hosepipe. The binding wire shall be looped around the tree at a height of 50% to 65% of the height of the tree above the ground and be firmly secured to each stake.

f) Maintenance

During the establishment period and during the maintenance period the Contractor shall regularly water the plants and keep the area immediately around the plants free from weeds and pests.

Every plant that, in the opinion of the Employer's Agent, is not healthy or shows unsatisfactory growth shall be replaced by the Contractor at his own expense.

**PG 5.6 GENERAL**

Grass, trees and shrubs shall be planted as far as is practicable during periods of the year approved by the Employer's Agent as most likely to produce best growing results. The Contractor shall programme his operations in such a manner that grass, trees and shrubs are planted during this period or periods.

The Contractor shall not plant any grass until all operations which may require heavy equipment to be taken over grassed areas have been completed. No heavy equipment, trucks or water carts shall

use areas which have been grassed and only equipment required for the preparation of areas, application of fertiliser and spreading of topsoil shall operate on areas to be grassed.

During construction the Contractor shall protect all areas susceptible to erosion by installing all the necessary temporary and permanent drainage works to the approval of the Employer's Agent as soon as practicable and by taking such other measures as may be necessary to prevent surface water from being concentrated in streams and from scouring slopes, banks or other areas.

Any runnels or erosion channels developing during the construction period or during the maintenance period shall be backfilled and compacted, and the areas restored to a proper condition. The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as practicable. All topsoil or other material accumulated in drains shall be removed and topsoil washed away shall be replaced.

## **PG 6 TOLERANCES**

Tolerances for earthworks shall be as prescribed in the relevant specifications. Areas to be landscaped or spoil dumps comprising dumped soil or topsoil and ordered to be landscaped shall be shaped to within 150mm of the prescribed levels provided that there are no changes of grade or marked irregularities that will affect the drainage and enhance the erosion potential and provided also that levels adjacent to paved drains and other structures are within 50mm of the levels indicated on the Drawings.

Area previously shaped shall be trimmed to within 100mm of the prescribed levels provided that there are no changes of grade or marked irregularities that will affect the drainage and enhance the erosion potential and provided also that levels adjacent to paved drains and other structures are within 25mm of the levels indicated on the Drawings.

Topsoil shall be spread to at least the specified thickness and where required on embankment and excavation slopes the finished surfaces shall comply with the tolerances specified for the embankment or excavation slopes in the relevant earthworks specifications.

Seed shall be batched and sown overall to within 5% and 10% of the prescribed requirements by mass respectively and shall be sown to within 15% of the prescribed requirements in areas as small as 1m square.

## **PG 7 TESTING**

The Contractor shall take representative soil samples for testing of all soils on which vegetation is to be established. The method and frequency of sampling of the soil shall be as approved by the Employer's Agent. Each sample shall be packed and labelled to the approval of the Employer's Agent to ensure that the sample is not damaged and that the point of sampling on the Site can be clearly and accurately identified.

Samples shall be submitted to a recognised agricultural soil laboratory approved by the Employer's Agent. In addition to performing analyses of the soil samples and reporting on the results of the analyses, the laboratory shall include recommendations for fertiliser and soil improvement additives for consideration and approval by the Employer's Agent. Analyses shall include tests for phosphate, potassium, calcium, magnesium, sodium, pH of the soil water, soil grading analyses and soil texture class.

## **PG 8 MEASUREMENT AND PAYMENT**

### **PG 8.1 BASIC PRINCIPLES**

The basic principles of measurement and payment for earthworks for landscaping is that bulk earthworks, the procurement and placing of topsoil or dumping of spoil in designated areas and

shaping the same to prescribed lines and levels shall be performed in accordance with the relevant earthworks specifications.

The basic principles of measurement and payment for trimming and finishing earthworks not to receive a grass cover and earthworks (topsoiling) in borrow pits and quarries is that it shall be performed in terms of the relevant specifications and that no measurement and payment will be made for such work in terms of this specification.

Measurement and payment for trimming will be made in terms of this specification for all areas that are to be grassed, except in the case of borrow pits and quarries.

**PG 8.2 SCHEDULED ITEMS**

**PG 8.2.1 Preparation of areas for grassing**

- a) Preparing areas that do not require topsoil for grassing ..... Unit : m<sup>2</sup>
- b) Preparing areas for grassing that require topsoil ..... Unit : m<sup>2</sup>

The area to be measured shall be the area grassed.

The rate shall cover the cost of trimming the area to be grassed to the specified tolerances, scarifying, removing and disposing of stones, procuring and placing small quantities of material to make up deficiencies, removing and disposing of small quantities of material, smoothing off the surface and all activities incidental to trimming the surfaces as specified.

**PG 8.2.2 Fertiliser**

- a) Agricultural Lime..... Unit : t
- b) Superphosphate..... Unit : t
- c) Gypsum..... Unit : t
- d) Limestone Ammonium Nitrate..... Unit : t
- e) 2:3:2 (22)..... Unit : t
- f) 3:2:1 (25)..... Unit : t

The rate shall cover the cost of sampling and testing the soils to be planted, furnishing the fertiliser and/or soil improvement material, transporting to the point of use and applying it to the soil or topsoil, irrespective of the method of application.

**PG 8.2.3 GRASSING**

- a) Planting and establishing grass cuttings ..... Unit : ha
- b) Planting and establishing nursery grown grass sods ..... Unit : ha
- c) Planting and establishing veld grown grass sods ..... Unit : ha
- d) Planting and establishing grass seeds by hand ..... Unit : ha
- e) Planting and establishing grass seeds by machine ..... Unit : ha
- f) Planting and establishing grass seeds by hydroseeding..... Unit : ha
- g) Planting and establishing grass seeds by vegetation cylinders (at indicated spacing) ..... Unit : ha

h) Planting grass seeds by baling natural grass ..... Unit : ha

The areas to be measured shall be the areas grassed.

The rate shall cover the cost of furnishing grass cuttings, sods, seeds, revegetation cylinders, bales of natural grass, cellulose pulp for hydroseeding and anti-erosion compounds, transporting to the point of use, planting, hydroseeding, anchoring, rolling, watering, weeding, replanting as necessary, erosion control and all other incidentals necessary to establish an acceptable grass cover as specified. In the case of veld sods the rate shall also cover the cost of levelling off and trimming the areas from which the sods have been taken.

**PG 8.2.4 Planting Trees and Shrubs**

a) Transplanting natural vegetation (of indicated types and size)..... Unit : No

b) Planting nursery grown plants (of indicated types and container size)..... Unit : No

The numbers of plants to be measured shall be the number of each type of plant and container size.

The rate shall cover the cost of excavating and refilling the plant holes with soil mixture, procuring and furnishing the plants, topsoil, crushed stone, compost, manure, fertiliser, timber stakes for anchoring and sheathed binding wire, transporting to the point of use, planting, anchoring, mulching, watering, weeding, control of insects and pests, replanting as necessary, affording necessary protection against wind, frost and direct sunlight and all other incidentals necessary to plant and establish the trees and shrubs as specified.

**PG 8.2.5 Maintaining Grassed Areas and Plants**

a) Maintaining Grassed Areas..... Unit : ha

b) Maintaining Trees and Shrubs..... Unit : No

The areas to be measured shall be the areas that have an acceptable grass cover at the end of the maintenance period and the numbers of plants to be measured shall be the numbers of established plants maintained and exhibiting normal healthy growth for the duration of the maintenance period.

The rates shall cover the cost of watering, weeding, mowing, pruning, erosion control, pest control, replanting and re-establishment of areas of grass that have not achieved an acceptable grass coverage or of trees or shrubs that are not healthy and show unsatisfactory growth and all other incidentals necessary to maintain the grass and plants as specified.

**PARTICULAR SPECIFICATION: PH**

**BRICKWORK AND PLASTER**

**PH1 SCOPE**

**PH1.1** This specification covers the general requirements for buildings and other masonry structures, including plastering.

**PH2 INTERPRETATION**

**PH2.1 Other relevant Standards/Specification**

This specification should be read together with SABS 1200 AA.

**PH2.2 Applicable Edition of Standards**

Each standard specification referred to in this specification shall be deemed to be the latest edition, applicable on the tender closing date.

**PH2.3 Definitions and Symbols**

For purposes of this specification, the definitions and symbols given in the National Building Regulations and Building Standards Act, 1977 (referred to further on in this specification as "Building Act"), where applicable, shall apply. (Definitions: pages 5 to 14, Symbols: page 23.)

**PH3 MATERIALS**

**PH3.1 Cement**

Cement shall conform to the requirements of SANS 50197.

**PH3.2 Lime**

Lime shall be of approved manufacture, well burnt and of uniform quality conforming with SABS 523.

**PH3.3 Sand**

Sand to be used for mortar and plaster shall comply with the requirements of SABS 1090.

**PH3.4 Clay Bricks**

Clay bricks must conform to SABS 227. A sample of bricks to be used for construction must be given to Employer's Agent for approval before construction bricks are delivered to site.

The contractor will be required to carry out necessary tests and provide certificates for compliance of the bricks with SABS 227. The cost of these tests will be deemed part of the scheduled rates and no additional payment will be made therefore.

Best quality Employer's Agenting bricks shall be used for all foundation and concealed situations.

**PH3.5 Damp-Proofing**

Material used as a damp proof course shall conform to the requirements contained either in SABS 248 or in SABS 952. Type FV fibre-felt sheets or Type C polyethylene sheets shall be supplied under the contract.

**PH3.6 Fibre Cement Sheets**

Fibre cement flat sheets, minimum 15 mm thick, shall comply with the requirements of SABS 685.

**PH3.7 Storage**

**PH3.7.1 Cement and Lime**

Cement and lime stored on the site shall be properly protected against moisture to the satisfaction of the Employer's Agent.

**PH4 CONSTRUCTION**

**PH4.1 Brickwork**

Brickwork shall be well and regularly bonded, with no false headers and none but whole bricks except where legitimately required as closers. All bricks must be thoroughly dampened before laying and each brick is to be laid with full joints and pressed into its bed so as to squeeze out superfluous mortar and give a finished joint not exceeding 8 mm thick in the case of the face work or 13 mm thick in the case of plastered walls or work not exposed to view.

All joints, both horizontal and vertical, notwithstanding any grade custom to the contrary, are to be filled solid with mortar for their full width and depth, each course being flushed with mortar, worked well down into all vertical joints before the succeeding course is laid. Horizontal joints and vertical joints of face work shall be pointed flush in manholes and catch pits, but shall be pointed and finished with a tooled recessed joint elsewhere. Plastered walls shall have the joints raked out to a depth not less than 13 mm and not more than 20 mm, and subsequently refilled with mortar of the same proportions as the original bedding mortar. In no circumstances may joints be so formed as to expose any perforation in the units.

Wire ties, where required, shall be stainless steel and are to be installed at 5 per square metre.

**PH4.2 Mortar**

The mix proportions for the mortar are given below:

Portland cement	50 kg
Lime	0-40 l
Sand*	200 l max.

\* measured loose and damp

**PH4.3 Plastering**

Plaster shall be of the same proportions as the bedding mortar. Any other plaster mixes will be subject to the approval of the Employer's Agent.

**PH4.4 Damp Proof Courses**

The areas to be covered by damp proof courses are indicated on the drawings. Damp proof shall be laid on a surface which shall not contain any sharp objects which may perforate the membrane. The full width of the wall and the whole area under the floor is to be covered by the membrane and shall overlap by not less than 100 mm under the floor, and by not less than 150 mm under the wall. All joints shall be effectively sealed. Where shown on the drawing, the damp proof course is to be stepped up one course of brickwork in the inner skin.

**PH4.9 Floor Finishes**

**PH4.9.1 Granolithic Floor Screed**

Granolithic shall consist of one part cement, one part sand and two parts 5 mm stone chips and oxide where required, thoroughly mixed as for concrete and placed in a layer not less than 20 mm thick, levelled or graded and trowelled to a smooth uniform surface. To ensure proper bond, the concrete surface to be covered shall be clean, roughened by chipping, flushed with water and coated with cement grout just before placing of the granolithic layer. Granolithic finish is to be steel floated with V joints in squares of 1,20 m to 1,80 m, the joints extending for the full depth of the granolithic. Joints are not required in the granolithic screed where it is to be overlaid by tiles or carpeting.

**PH4.11 Weather**

In any period of interruption caused by inclement weather, and at the completion of each day's bricklaying, freshly laid brickwork should be protected.

## DRILLING

### PI1 SCOPE

It is not foreseen that this will be required for this project, but included if it should become necessary. This specification deals with :

- a) drilling and marking of exploratory rotary diamond borings, the main purpose being for the recovery of cores and testing for water loss;
- b) drilling holes for exploratory purposes such as testing for water loss and the drilling of holes for drainage, instrumentation, rock support and grouting by means of rotary percussion methods; and
- c) drilling of large diameter well-screened holes to be drilled mainly in soils and unconsolidated alluvial material.

The maintenance of accurate drilling records and the disposal of waste, the storage and transport of cores, the marking of boreholes, the cleaning up of the areas upon completion of the work and all other operations that are incidental to performing the above operations also fall within the scope of this specification.

An additional obligation of the Contractor shall be to measure and record water levels in certain boreholes, or holes specifically drilled for this purpose as may be instructed by the Employer's Agent from time to time.

### PI2 INTERPRETATIONS

#### PI2.1 Supporting Specifications

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

##### PI2.1.1 Definitions

For the purpose of this specification the definitions and abbreviations given elsewhere in this document and the following definitions shall apply :

Confined hole : A hole drilled in any required direction above or below horizontal where an immovable obstruction such as a wall or rock face would prevent a straight rod of 2,5 m length being inserted into the hole.

Drainage hole : A drainage or pressure relief hole is a hole required to relieve hydrostatic pressure in the rock mass or concrete. It may be drilled from the surface or from a gallery, through concrete or through a pipe embedded in the concrete for this purpose.

Exploratory hole : A hole drilled to obtain information about the ground conditions either by recovering a cored sample of as much of the material drilled that is feasible and/or to only recover drill cuttings and to provide access for the purpose of testing.

Grout hole : A hole drilled for the purpose of injecting grout into the ground.

Instrumentation hole : A hole drilled for the purpose of placing instruments in the structure, soil or rock.

Well-screened hole : A hole, usually of large diameter drilled in soil or unconsolidated gravels or boulders to be developed with filter gravel and a screened inner casing.



**PI3 MATERIALS**

**PI3.1 General**

Subject to the Employer's Agent's approval of materials used, the Contractor shall make his own arrangements for any materials required for the satisfactory completion of the work.

**PI3.2 Water**

Water used for drilling shall be clean and free from deleterious amounts of acids, alkalis, suspended clay and other substances, which may have a detrimental influence on drilling performance or on the subsequent behaviour of the drilled hole when being tested for water loss or when being grouted.

**PI3.3 Drilling Fluid**

Drilling fluid shall only be used where previously agreed to by the Employer's Agent and shall be such that it does not change the properties of the rock or soil or seal the inner wall of the hole. Bentonite and other similar drilling muds shall not be used.

**PI3.4 Core Boxes**

Core boxes shall have lids, shall be supplied by the Contractor, shall be suitable for storing NX and NXC size cores, shall be of timber or steel and their design/construction shall be approved by the Employer's Agent.

**PI3.5 Casing Materials**

**PI3.5.1 General**

All metal and uPVC pipes and fittings required for casings and standpipes shall be of the size matching the particular size of hole being drilled and shall be furnished, cut, threaded, fabricated and embedded by the Contractor.

**PI3.5.2 Core Holes**

Steel casings required for core holes shall be flush screw-jointed conforming to the requirements of BS 4019: Part 1, while steel tubes used for standpipes to mark the boreholes may be of medium duty black steel conforming to BS 1387. Casings of uPVC shall conform to the requirements of SANS 966 and shall be to Class 6.

**PI3.5.3 Drainage Holes**

The pipes required for drainage holes shall be as specified on the Drawings.

**PI3.5.4 Grout Holes**

The pipes required for grout holes shall be as specified on the Drawings.

**PI4 PLANT**

**PI4.1 General**

All equipment shall be in good mechanical condition with adequate capacity and suitable for doing the work. Full details of all drilling equipment shall be submitted to the Employer's Agent for approval before starting any drilling operation.

The Contractor shall provide and maintain all drilling machines and equipment needed for drilling the holes to the sizes and depths shown on the Drawings, in the Bill of Quantities or in the Scope of Work.

The Contractor shall provide equipment capable of measuring the slope and direction of holes accurately to within 1 degree.

All drilling equipment shall be capable of drilling holes in compliance with the tolerances set out in **Clause PI6** of this specification (Particular Specification PI: Drilling).

#### **PI4.2 Rotary Core Drilling Equipment**

Rotation type drilling equipment, using core type bits, capable of drilling holes up to 120 mm dia. and at any angle below the horizontal shall be used to drill core holes. The equipment shall be fitted with hydraulic feed and be capable of drilling holes to the depths shown on the Drawings, in the Bill of Quantities or in the Scope of Work.

Core recovery equipment shall normally be double tube ball-bearing swivel "M" series core barrels fitted with bottom discharge diamond crowns. Tungsten carbide or other types of crowns may be used only with the approval of the Employer's Agent. Triple tube core barrels equipped with split inner barrels shall be used as directed by the Employer's Agent.

#### **PI4.3 Rotary Percussion (top hammer) Drilling Equipment**

Rotary percussion type drills, with water flushed through hollow drill rods for the removal of drill cuttings shall be used for drilling holes between 38 mm diameter up to 120 mm diameter. The drills shall be capable of drilling holes at any angle to depths of at least 60 m.

#### **PI4.4 Rotary Percussion (bottom hammer) Drilling Equipment**

Rotary percussion type drilling equipment where the rotary head of the unit is attached to the boom of the machine on surface and the percussion or hammer unit is attached to the bottom rod, shall generally be used for drilling large diameter holes with a cased internal diameter of up to 450 mm to a depth of at least 20 m. The percussion or hammer unit shall be driven by compressed air fed down the drill string. Subject to the approval of the Employer's Agent, removal of drill cuttings can be by compressed air, water or foam, depending on the ground conditions, provided also that the permeability of the surrounding ground is not reduced.

When drilling in unstable ground conditions where the installation of casings cannot be achieved by normal methods, the drilling equipment shall be equipped with a system whereby casing of an internal diameter not less than the specified hole diameter proceeds concurrently with drilling, such as the "ODEX" or a similar system.

#### **PI4.5 Auger Drilling Equipment**

Continuous-flight auger shall be used for drilling instrument boreholes through earthfill embankment materials where shown on the Drawings. No drilling fluids shall be used.

Helical auger shall be used for drilling larger diameter holes through alluvial or colluvial materials.

### **PI5 CONSTRUCTION**

#### **PI5.1 General**

Drilling, sampling and testing shall be performed in a workmanlike manner and only by competent and experienced workmen. The Contractor shall submit details of the qualifications and experience

of the supervisors and operators he proposes to use to the Employer's Agent for approval before starting any drilling operation.

Although not normal practice, holes drilled by means of rotary core drilling equipment may also be used for purposes other than only exploratory purposes.

The Contractor shall ensure that no pollution of the Site or defacement of structures occurs as a result of drilling operations.

The positions, directions, depths, sizes and inclinations of holes and the type of drilling equipment to be used shall be as indicated in these specifications, on the Drawings or as directed by the Employer's Agent. The Contractor shall set out all holes to be drilled.

All holes shall be drilled straight without deflection in the directions and at the inclinations indicated.

Modifications to the techniques specified in this specification, the Scope of Works or on the Drawings may become necessary as work proceeds and as knowledge and experience is gained of the natural rock and other foundation conditions. The Contractor shall alter or vary his operations, after approval by the Employer's Agent, or if directed by the Employer's Agent, to suit such knowledge and experience of the natural rock and other foundation conditions.

No blasting shall be permitted within a radius of 100 m from completed grout holes.

Due allowance shall be made by the Contractor for interrupting the drilling to flush or pressure wash the boreholes and to perform water pressure tests to survey the boreholes if required in terms of the Contract or to rinse, flush or grout sections of boreholes.

#### **PI5.1.1 Loss of hole**

If jamming of a hole or other cause makes continuation of the drilling impossible, the Contractor shall immediately inform the Employer's Agent and request instructions for siting of a substitute hole or otherwise. If the Employer's Agent considers the desired purpose of the hole has been achieved no substitute hole will be necessary.

No payment shall be made for a "lost" hole, either for drilling, grouting or any other respect unless the Employer's Agent considers that the desired purpose has been obtained from the hole in which case payment shall be made under the relevant items. Where required, the "lost" hole shall be grouted up at the Contractor's expense.

#### **PI5.2 Drilling Core Holes**

Where exploratory drilling for the purpose of recovering cores is required, the position, direction, depths and order and timing of drilling the holes shall be as specified in the Scope of Work or shown on the Drawings or as directed by the Employer's Agent.

Drilling through overburden shall normally be NXC size or larger as approved by the Employer's Agent and holes shall be drilled to a minimum size of NX through all strata.

The use of the BX size series shall only be allowed by the Employer's Agent where grouting has failed to stabilise weak formations occurring beneath an uncased length of NX size hole.

All drilling, sampling and testing shall be performed in a workmanlike manner to ensure maximum core recovery in accordance with the requirements of this specification. Drilling fluids other than water, to improve core recovery and/or to prevent caving of drill holes shall only be used after having obtained the approval of the Employer's Agent. Any additives mixed with drilling water shall be degradable with time. Bentonite mud, rod grease and "red dope" shall not be used.

The Contractor shall pay particular attention to the recovery and preservation of any soft materials such as decomposed friable rock and shall exercise the utmost care to ensure that cores are not damaged during drilling, particularly where borehole surveys and core orientations are being performed.

When zones of badly fractured rock or soft material occur and core losses by normal drilling methods are likely to be high and if ordered by the Employer's Agent, the Contractor shall modify his drilling methods over such sections to obtain maximum recovery of all soft material present in fracture zones or between layers of hard material. Only bottom discharge bits shall be used in such areas and the penetration and rotation speeds and rate of application of drilling water shall be reduced together with the exercise of such further measures as may be necessary to ensure that the maximum core recovery is obtained. Under these conditions the rate of advance of the hole shall also not exceed 500 mm at a time before recovering the core.

Caving in a borehole shall be corrected either by the insertion of casings in oversize drilled or cased holes, by drilling of casings, or by grouting, as previously agreed by the Employer's Agent and having in mind the expected ultimate depth of the hole and the preferred core size at that depth. The type of casing to be used shall be previously agreed by the Employer's Agent.

Casings, other than those standpipes used to mark the holes, shall where practicable be installed by the Contractor in such a manner that easy removal of the casings is facilitated. All casings shall be cleaned thoroughly of all dirt, grease or oil before embedment.

In some instances the Contractor may be required to leave sections of casings in position. Casings shall generally be extracted upon completion of any particular hole but only with the prior permission of the Employer's Agent.

Where casings are inserted by drilling of the casing, the casing shall be fully advanced after each drill run and the bottom of the hole cleaned out before proceeding to drill the hole any deeper.

Where caving is to be overcome by grouting this shall be performed using a thick grout to seal the section and then re-drilling through the set grout. The Contractor shall use grout sufficient to stabilise the walls of the caving section only and such as will enable drilling to continue, but not so much that the surrounding ground is made impermeable. This method shall be employed whenever the core being recovered is equal to the specified minimum size for the particular hole.

When caving ground is encountered or casings are installed, water pressure tests shall be conducted before correcting the caving or installing the casing. The full depth of the hole above and including any caving section as well as below any casing shall have been water pressure tested to the approval of the Employer's Agent before the caving is corrected or before the casing is advanced.

The Contractor shall accurately determine the length of borehole drilled (depth in the case of vertical holes) at the completion of each drill run by means of measuring the "stick-up". Records of such determinations shall be available at all times at the drill rig for inspection by the Employer's Agent.

### **PI5.3 Drilling Grout Holes**

All holes for grouting shall be drilled either by rotary percussion or rotary core drilling methods in the sequence and at the locations, in the directions, at the inclinations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent. Standpipes, nipples or casings set in the concrete or rock shall generally only be required for grout holes in fractured and/or weak rock, where surface water or debris can enter the top of the hole or as shown on the Drawings or instructed by the Employer's Agent.

Grout holes shall be drilled in stages conforming to the specified grouting stages using the split spacing method. The spacing of the primary holes will depend on conditions encountered and shall be as indicated on the Drawings or as directed by the Employer's Agent, but in general they shall be

spaced at a distance of 8 m for curtain grout holes and 4 m for blanket grout holes. Sequential holes shall only be drilled at the instruction of the Employer's Agent.

The Contractor shall ensure that drill bits used to drill grout holes are in good order so that excessive wear of bits will not cause wedging if at any time a hole has to be deepened.

Each hole drilled shall be protected from becoming clogged or obstructed by means of a screw cap on the standpipe or other suitable device. Any hole that becomes clogged or obstructed before completion of grouting shall be cleaned out in a manner to the satisfaction of the Employer's Agent or another hole provided.

Whenever drill water is lost, or artesian flow is encountered, the drilling operation shall be stopped and the hole cleaned, pressure tested and grouted in accordance with the relevant specification and to the instructions of the Employer's Agent before drilling operations are resumed. The grout so remaining in a partially completed hole shall be removed therefrom by flushing or other methods before it has set sufficiently to require redrilling.

Where casings are used when drilling in caving ground such casings shall be supplied and installed by the Contractor in such a manner that easy removal of the casings is facilitated. All casings shall be cleaned thoroughly of all dirt, grease or oil before embedment. The Contractor may be instructed to leave sections of well casing in position.

In situations where it proves impossible to install casings in caving ground with conventional methods due to collapsing of the hole, the Contractor shall, with the approval of the Employer's Agent, use specialised drilling methods whereby the casing proceeds concurrently with drilling, such as the "ODEX" method.

Where drilling through concrete placed in the Works is required, the Contractor may substitute pipes of the appropriate diameter in lieu of such drilling, subject to the approval of the Employer's Agent.

#### **PI5.4 Drilling Drainage Holes**

All drainage holes shall be drilled through sleeves set in the concrete for this purpose, at the locations, in the directions, at the inclinations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent.

Drainage holes shall be drilled by rotary percussion drilling methods using either top hammer or bottom hammer equipment.

Drainage holes shall not be drilled until such time as the grouting operations will no longer be able to cause any blockages of drainage holes, but in any event not until the approval of the Employer's Agent has been obtained for drilling such holes. After drilling, flushing and pressure testing of drainage holes, the Contractor shall make such connections to the drainage hole sleeves as are shown on the Drawings or ordered by the Employer's Agent in order to lead the water to approved collector mains or points.

Each hole drilled shall be protected from becoming clogged or obstructed by means of a screw cap or other suitable device on the sleeve and any hole that becomes clogged or obstructed before completion and acceptance of all drainage holes drilled shall be cleaned out in a manner satisfactory to the Employer's Agent or another hole provided by the Contractor.

Whenever the drill water is lost, caving ground or artesian flow is encountered, drilling operations shall cease until the Employer's Agent has been informed and has inspected the particular hole. Such sections shall not be grouted and the Contractor shall install such plain or perforated casings as the Employer's Agent may order.

Where casings are used when drilling in caving surface material, such casings shall be supplied by the Contractor and grouted into the underlying rock such that the casings cannot be extracted with a

tractive effort of 2 tonnes. Drilling operations shall cease until such time as the grout has set sufficiently to ensure that the casing will not become dislodged by the subsequent drilling operations.

All casings shall be cleaned thoroughly of all dirt, grease or oil before embedment.

#### **PI5.5 Drilling Well-screened Holes**

All holes for drainage wells shall be drilled at the locations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent.

Drainage wells shall be drilled by means of bottom hammer percussion methods or such other methods as the Employer's Agent may approve. The Contractor shall supply and install temporary casings that fit tightly against the sides of the completed drainage well holes. In caving conditions casings shall be installed concurrently with the drilling, otherwise casings shall be installed immediately after the completion of the hole.

Drilling mud shall not be used and where appropriate the Contractor shall flush the holes with clean water to remove all mud cake from the sides of the holes.

In addition to the records required in terms of **Clause PI5.12** of this specification the Contractor shall maintain on Site, for each drainage well, a drilling log which shall include the following information :

- reference number of well;
- date(s) drilled;
- drilling equipment used;
- diameters drilled;
- general description of strata and depths encountered;
- water level measurements;
- penetration rate;
- depths samples taken; and
- details of casings and depths.

Within one day of completion of each well, a typed copy of the drilling log shall be delivered to the Employer's Agent.

The Contractor shall take samples of the drilled material at 1,0m intervals and at each change of strata. Each sample shall be placed in a polythene sample bag, clearly marked with the well reference number and the depth at which the sample was taken. The Contractor shall store these samples on Site in a well ventilated, weatherproof building. They shall be stored in such a manner that the sequence of sampling is maintained and access for examination is readily obtainable. The samples shall be accessible to the Employer's Agent at all times. On completion of the construction of the wells, all samples shall be delivered, in sequence, to the Employer's Agent.

Immediately after completion, the drilled holes shall be provided with a temporary steel cover and be capped to the satisfaction of the Employer's Agent to prevent persons or animals from falling in. The Contractor shall, to the satisfaction of the Employer's Agent, furthermore temporarily fence off any open well-screened holes in the process of being drilled or cased to ensure that no persons or animals could fall into the hole.

#### **PI5.6 Drilling Instrumentation Holes**

All holes for the installation of instrumentation shall be drilled at the locations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent. Instrumentation holes shall generally be drilled by percussion type methods using bottom hammer equipment, unless otherwise instructed by the Employer's Agent. Where holes for instrumentation are to be drilled through placed earthfill embankment materials, continuous flight auger shall be used for such drilling.

Each hole drilled shall be protected from becoming clogged or obstructed until such time as the instrumentation is installed. Where casings are installed in caving ground, these shall be left in the hole until such time as the Employer's Agent approves their removal.

**PI5.7 Drilling Holes for Dowels, Rockbolts and Rock Anchors**

Holes for the installation of rock dowels, rockbolts and rock anchors shall be drilled at the locations, in the directions, at the inclinations and to the depths and diameters shown on the Drawings or ordered by the Employer's Agent. Holes for dowels, rockbolts and rock anchors shall be drilled by percussion type methods using either top hammer or bottom hammer equipment, unless otherwise directed.

Each hole drilled shall be protected from becoming clogged or obstructed by means of the installation of a temporary wooden plug or other suitable device. Any hole that becomes clogged or obstructed before installation of the rock support or the dowels shall be cleaned out in a manner satisfactory to the Employer's Agent or another hole provided.

**PI5.8 Cores**

**PI5.8.1 Storage of Cores**

The Contractor shall construct a core shed to the dimensions and of the materials shown on the Drawings. A convenient site will be indicated by the Employer's Agent. All doors shall be provided with locks having a single master key. Four copies of the master key shall be delivered to the Employer's Agent after completion of the core shed.

**PI5.8.2 Handling of Cores**

On removal from the core barrel, the cores shall be placed directly into core boxes in the correct sequence and longitudinal orientation. Very broken core shall be contained in a transparent plastic sheath, if so ordered by the Employer's Agent. The bottom depth of each core run shall be indelibly marked on a wooden block or other approved marker, inserted into the core box at the bottom of the particular length of core. The length of core recovered shall not be taken as a measure of the length or the depth of the borehole. The depth of the borehole shall be determined by measuring the total length of equipment (core barrel and drill rods) in the hole and subtracting the length of drill rod protruding from the borehole (stick-up).

If long core specimens are deliberately broken to enable them to fit into the core boxes then this shall be clearly marked on the core at the plane of rupture. Wooden spacers of the appropriate length and suitably and indelibly marked shall be placed in the core box where a significant loss of core has been encountered.

Where cores of sizes smaller than the compartment sizes are placed in a core box, the core shall be tightly wedged in position by means of continuous wooden spacers along the sides of the cores.

Each core box shall be clearly marked with the site name, the borehole number and inclination, the depths between which drilled and the core box sequence number for the particular borehole. No core box shall contain the cores of more than one hole.

Special care shall be taken during drilling to recover soft material, to locate geological contacts, shattered zones, open fissures, cavities and loss of drilling fluid, and the depth at which they occur shall be clearly marked on the cores or in the core box as appropriate.

The cores shall be kept at the borehole during drilling, and the Contractor shall ensure that they are protected from the weather and are not disturbed. On completion of the drilling of a hole the cores in

their core boxes shall be transported to the designated core shed and be stored in an overlay sequence.

Before the core boxes are stacked they shall be made available to the Employer's Agent for photographing.

#### **PI5.9 Marking Exploratory Holes**

Unless otherwise instructed by the Employer's Agent, the positions of all exploratory boreholes shall be clearly marked by means of standpipes consisting of flush screw-jointed steel well casing of HW size or equivalent medium duty steel tube projecting 500mm above the top of the ground with the lower end embedded 500mm into hard ground or 2000 mm into soft ground or boulders, whichever is the shallower.

The standpipes shall be surrounded by a concrete collar 500 mm in diameter or 500 mm square and 200 mm thick, on which is legibly marked the number of the borehole, the depth, inclination and the date of completion. Concrete used shall be a nominal 1:3:6 mix and shall be cast as soon as all casings that have been ordered to be removed have been removed from the particular hole.

Completed holes shall be suitably capped with a bolted (with lock nuts) steel cap to prevent the holes from becoming clogged or obstructed. Any borehole which becomes clogged shall be cleaned out in a manner satisfactory to the Employer's Agent. The joints of the standpipe shall be made snug and the assembly held firmly in position and protected from damage or displacement until the concrete collar has hardened sufficiently.

#### **PI5.9.1 Plugging Exploratory Holes**

Existing exploratory boreholes on the Site as well as holes drilled during the Contract for exploratory purposes and not used for any other purpose such as for grout or drainage holes, shall be plugged as described below, unless otherwise ordered by the Employer's Agent. The Employer's Agent shall identify and/or locate the holes that need to be plugged and such plugging shall be carried out at an early stage of the Contract, before the standpipes or identification marks are damaged by construction activities.

All holes that have become clogged shall be cleared before being plugged. Where necessary to clear the hole, rotary percussion equipment may need to be employed.

The plugging of existing exploratory holes and holes drilled for the recovery of cores shall be carried out as specified below.

- a) Where the hole, or portion thereof, is in rock, one stage grouting in using a fairly stiff grout shall be carried out. No water pressure test will be required.
- b) Where the hole, or portion thereof, is in overburden, which may or may not have a casing, it shall be backfilled with a 1:2 mixture (by volume) of cement and water. If the hole is dry the grout may be poured from the top but, if the hole contains standing water, the grout shall be fed through a tremie pipe, the outlet of the tremie pipe being kept submerged in the grout at all times.

If running water is encountered in the hole, the Employer's Agent shall direct the procedure to be followed.

- c) Where the hole, or portion thereof is in a concrete structure, it shall be progressively backfilled with a 1:0,75 mixture (by volume) of cement and water well rodded into place.



**PI5.9.2 Drilling Records**

The Contractor shall each day provide the Employer's Agent with an accurate record on forms approved by the Employer's Agent of all holes drilled on the previous day. A suitable form is given in Appendix B. A separate form is required for each stage of a hole.

The information provided shall *inter alia* include the following :

- a) The reference number, location of the hole, drilling method and stage of hole (where applicable).
- b) The actual positions of the boreholes recorded to an accuracy of 20 mm and the actual directions and inclinations of the borehole at the borehole collars recorded to within an accuracy of 1 degree of arc.
- c) A description of all materials encountered, their locations in the holes, the material recovery for each stratum, changes in the formation (fissures, cavities, seams, etc.) and any other data which may help in the evaluation of the ground. The "Recommendation for Standardised Core Logging" of the South African section of the Association of Environmental and Employer's Agenting Geologists shall be used in this regard.
- d) Size and type of bits used.
- e) Levels at which groundwater was encountered and wash-water lost or gained.
- f) Drilling pressures and rotation speeds.
- g) Any relevant incidents that occurred during the course of the work.

**PI6 TOLERANCES**

**PI6.1 General**

Unless otherwise indicated on the Drawings or in the Scope of Work, all holes for rock support shall be collared to a tolerance of 75 mm, whereas all other holes to be drilled from the ground surface shall be collared to a tolerance of 300 mm of the specified position or 15% of the specified distance between holes, whichever is the lesser. All holes, except for precision drilled instrumentation holes defined below, shall be drilled to a tolerance of 3 degrees of the specified inclination and orientation. Where holes are drilled through mass concrete, such as for grout holes or drainage holes, the holes shall be collared to a tolerance of 50mm of the specified position and shall be drilled to a tolerance of 3 degrees of the specified inclination and orientation. Nipples or sleeves set in concrete to act as guides for drilling shall be set in the concrete to a tolerance of 30 mm. The holes shall be drilled to within 0,5 m of the specified final depth and/or stage depth.

The verticality of precision drilled instrumentation holes shall not deviate by more than 0,3% of the distance from the top of the hole to the depth tested when measured from a vertical through the centre of the top of the hole.

**PI7 TESTING**

Not applicable.

**PI8 MEASUREMENT AND PAYMENT**

**PI8.1 General Principles**

Specific items such as drilling, coring and casings will be measured by length and classified by size, making provision for various ground conditions. With the exception of casing, payment for materials used shall be limited to those installed in the Permanent Works, which shall be classified according to their nature and usage. Measuring of water levels as required from time to time shall be covered by the various drilling rates.

No measurement for payment shall be made for the redrilling of any percussion drilled hole due to wedging caused by the excessive wear of drill bits. No measurement for payment shall be made for providing another hole or for cleaning a drilled hole that becomes clogged or obstructed before the completion of flushing, pressure washing, water testing, grouting, borehole surveys, the installation of rock support or instrumentation and the construction of well-screens.

Redrilling required of grout holes due to the Contractor's failure to clean out a hole before grout in the hole has set, shall not be measured for payment, except in the case where the Employer's Agent has instructed the Contractor that the grout be allowed to set.

No measurement for payment shall be made for interrupting the drilling to flush or pressure wash the boreholes and to perform water pressure tests, to survey the boreholes, or to flush, rinse and grout sections of boreholes that are being drilled. In the case of grout holes the Contractor would be entitled to additional measurement under **Clause 0** if the drilling equipment has been moved, with the approval of the Employer's Agent, to drill another grout hole while grouting of the particular hole is in progress.

**PI8.2 Scheduled Items**

**PI8.2.1 Setting up over Holes**

The rates shall cover all costs of setting out the hole position, setting up plant and equipment at each hole and moving the same to the next hole, including for handling and transporting plant and equipment, any excavation, or filling necessary for setting up platforms, and cleaning up on completion of each hole.

Adjustment of the drilling equipment to deal with a number of angled holes at one position shall not be regarded as separate setups.

Separate items shall be provided for different types of drilling equipment.

Should a hole be drilled as a single stage operation, then setup measurement shall be made for a single setup. Should a hole be drilled as a successive stage operation, then setup measurement shall be made for each and every stage.

- a) Setting up plant and equipment for core drilling..... Unit : No.

The number of core drilling setups shall be measured.

- b) Setting up plant and equipment for top hammer percussion drilling..... Unit : No.

The number of setups for drilling percussion holes shall be measured.

- c) Setting up plant and equipment for bottom hammer percussion drilling..... Unit : No.

The number of setups for drilling holes with a bottom hammer percussion drill rig shall be measured regardless whether a "ODEX" or other similar system is used.

- d) Setting up plant and equipment for auger drilling..... Unit : No.

Separate measurements shall be made for continuous flight auger and large diameter helical auger drilling.

- e) Extra-over **Clauses PI0a), 0b), 0c) or 0d)** for setting up plant and equipment for drilling confined holes..... Unit : No.

The number of setups for drilling confined holes as defined in **Clause 0** shall be measured. No distinction shall be made for different types of equipment.

**PI8.2.2 Stand by**

- a) Core drilling rig..... Unit : hr

- b) Percussion drilling rig..... Unit : hr

- c) Grouting installation..... Unit : hr

The rate shall include the plant, ancillary equipment and labour associated with the item, that has been ordered, by the Employer's Agent, to stand by while awaiting further instructions.

The rate shall cover the charges for the plant and equipment during ordinary working hours, while awaiting instructions from the Employer's Agent.

It shall not cover time during which the plant and equipment are standing-by while tests and other operations necessary for the completion of the work are being carried out.

**PI8.2.3 Rotary Core Drilling..... Unit : m**

The length of hole drilled vertically to 30° from the downward vertical as approved or instructed by the Employer's Agent shall be measured. Separate items shall be scheduled for various drill sizes.

For purposes of measurement distinction shall be made between the following categories of materials:

- Soft Material

Soft material is defined as soil, gravel and soft rock which can be augered by means of a small diameter auger fitted to the drill rig.

- Hard Material

Hard material is defined as rock which cannot be classified under (a) and includes material where more than 30% of the volume of the hole is occupied by boulders larger in diameter than the diameter of the hole.

- Set Grout

Set grout is defined as grout which has been allowed to set as directed by the Employer's Agent. No measurement shall be made for redrilling through grout which has set due to the Contractor's failure to wash out a hole before the grout has set.

- a) Extra-over **Clause 0** for drilling inclined holes flatter than 30° from the downward vertical..... Unit : m

The length of core-drilled holes drilled flatter than 30° from the downward vertical shall be measured. Separate items shall be scheduled for various drill sizes.

- b) Extra-over **Clause 0** for drilling with a triple tube core barrel..... Unit : m

The length of core-drilled holes drilled with a triple tube core barrel as instructed by the Employer's Agent shall be measured. Separate items shall be scheduled for various drill sizes.

- c) Extra-over **Clause 0** for drilling confined core-drilled holes..... Unit : m

The length of confined core-drilled holes shall be measured. No distinction shall be made between the various drill sizes and between the different categories of materials.

#### PI8.2.4 Casings

Measurement for payment for casings shall distinguish between casings installed in core-drilled holes, top hammer percussion drilled holes and bottom hammer percussion drilled holes. Measurement for payment shall distinguish between casings removed, casings which are left behind or jammed in the hole and the different sizes and types of casings used. No distinction shall be made between installing casings in vertical or inclined holes.

The rates shall cover all costs for the supply and placing of all materials, labour, tools, equipment and plant necessary to complete the work as specified in this Specification, regardless of the depth to which casing is installed. No extra measurement for payment shall be made for the use of drilling fluids or muds for the installation of casing. No extra measurement for payment shall be made for casings which are installed concurrently with the drilling process, such as the "ODEX" drilling system.

- a) Core-drilled holes : Temporary casings..... Unit : m

The length of casing actually installed and subsequently removed shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- b) Core-drilled holes : Permanent casing..... Unit : m

The length of casing actually installed to be left permanently in the hole, either on instruction of the Employer's Agent or due to casings which, in the opinion of the Employer's Agent, are irrecoverably jammed in the hole shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- c) Extra-over **Clauses 0a) or 0b)**, for casings installed by drilling..... Unit : m

The length of casing installed by drilling the casing shall be measured. Distinction shall be made between the different categories of material as defined in **Clause 0**.

- d) Extra-over **Clauses 0a)** or **PI0b)** for casings installed in confined core-drilled holes..... Unit : m

The length of casing installed in confined core-drilled holes shall be measured. No distinction shall be made between the various sizes and types of casings used.

- e) Top hammer percussion-drilled hole : Temporary casing..... Unit : m

The length of casing actually installed and subsequently removed shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- f) Top hammer percussion-drilled hole : Permanent casing..... Unit : m

The length of casing actually installed to be left permanently in the hole, either on instruction of the Employer's Agent or due to casings which, in the opinion of the Employer's Agent, are irrecoverably jammed in the hole shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- g) Extra-over **Clauses 0e)** or **0f)** for casings installed in confined top hammer percussion-drilled holes..... Unit : m

The length of casing installed in confined top hammer percussion-drilled holes shall be measured. No distinction shall be made between the various sizes and types of casings used.

- h) Bottom hammer percussion-drilled hole : Temporary casing..... Unit : m

The length of casing actually installed and subsequently removed shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- i) Bottom hammer percussion-drilled hole : Permanent casing..... Unit : m

The length of casing actually installed to be left permanently in the hole, either on instruction of the Employer's Agent or due to casings which, in the opinion of the Employer's Agent, are irrecoverably jammed in the hole shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

- j) Extra-over **Clauses 0h)** or **0i)** for casings installed in confined bottom hammer percussion-drilled holes..... Unit :m

The length of casing installed in confined bottom hammer percussion-drilled holes shall be measured. No distinction shall be made between the various sizes and types of the casings used.

- k) Casing shoes left in place..... Unit : No

The number of casing shoes used to insert casing by drilling and that in the opinion of the Employer's Agent cannot be recovered or are ordered by the Employer's Agent to be left in place shall be measured. Distinction shall be made between the various sizes of casing shoe left in place.

- l) Auger drilled hole : Temporary casing..... Unit : m

The length of casing actually installed and subsequently removed shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

m) Auger drilled hole : Permanent casing..... Unit : m

The length of casing actually installed to be left permanently in the hole, either on instruction of the Employer's Agent or due to casings which, in the opinion of the Employer's Agent, are irrecoverably jammed in the hole shall be measured. Measurement shall distinguish between the various sizes and types of casings used.

**PI8.2.5 Rotary Percussion (top hammer) Drilling..... Unit : m**

The length of hole drilled vertically to 30° from the downward vertical as approved or instructed by the Employer's Agent shall be measured. Separate items shall be scheduled for various drill hole sizes.

For purposes of measurement distinction shall be made between the following categories of materials:

- Soft Material

Soft material is defined as soil, gravel and soft rock which can be augered by means of a small diameter auger, fitted to a rotary core-drilling rig.

- Hard Material

Hard material is defined as rock which cannot be classified under (a) and includes material where more than 30% of the volume of the hole is occupied by boulders larger in diameter than the diameter of the hole.

- Set Grout

Set grout is defined as grout which has been allowed to set as directed by the Employer's Agent. No measurement shall be made for redrilling through grout which has set due to the Contractor's failure to wash out a hole before the grout has set.

a) Extra-over **Clause 0** for drilling inclined holes flatter than 30° from the downward vertical..... Unit : m

The length of hole drilled flatter than 30° from the downward vertical by means of the top hammer percussion method shall be measured. Separate items shall be scheduled for various drill sizes.

b) Extra-over **Clause 0** for drilling confined top hammer percussion-drilled holes..... Unit : m

The length of confined top hammer percussion-drilled holes shall be measured. No distinction shall be made between the various drill sizes and between the different categories of materials.

**PI8.2.6 Rotary Percussion (bottom hammer) Drilling..... Unit : m**

The length of hole drilled vertically to 30° from the downward vertical as approved or instructed by the Employer's Agent shall be measured. Separate items shall be scheduled for various drill hole sizes. For purposes of measurement distinction shall be made between the different categories of materials as defined in **Clause 0**.

- a) Extra-over **Clause 0** for drilling inclined holes flatter than 30° from the downward vertical..... Unit : m

The length of hole drilled flatter than 30° from the downward vertical by means of the bottom hammer percussion method shall be measured. Separate items shall be scheduled for various drill sizes.

- b) Extra-over item **Clause 0** for "ODEX" drilling..... Unit : m

The length of hole drilled by the "ODEX" or a similar method as approved or instructed by the Employer's Agent shall be measured. Separate items shall be scheduled for various hole sizes.

- c) Extra-over **Clause 0** for drilling confined bottom hammer percussion-drilled hole.... Unit : m

The length of confined bottom hammer percussion-drilled holes shall be measured. No distinction shall be made between the various drill sizes and between the different categories of materials.

**PI8.2.7 Auger drilling..... Unit : m**

The length of hole drill shall be measured and separate items will be scheduled for different types of auger drilling and different drill hole sizes.

**PI8.2.8 Extra-over item 0, 0 or 0 for precision drilling of instrumentation holes..... Unit : m**

The length of precision drilled hole shall be measured.

**PI8.2.9 Cores**

- a) Extra-over Item **0** for core recovery..... Unit : m

The length of undamaged core recovered, placed in core boxes and accepted by the Employer's Agent, shall be measured. Distinction shall be made for various core sizes.

The rate shall be not less than 25% or more than 75% of the corresponding rate in **Clause 0** for core drilling of the same size. The rate shall include for all costs of handling cores as specified in **Clause 0** and of special methods adopted according to **Clause 0** to ensure recovery of the greatest possible length of complete core, including for the use of drilling mud when ordered by the Employer's Agent.

- b) Core boxes..... Unit : m

The length of compartment of core boxes containing cores shall be measured. The rate shall cover the cost of providing core boxes on Site, the temporary waterproof storing on Site and transport to permanent storage on Site, if so required by the Employer's Agent.

- c) Marking of exploratory holes..... Unit : No

The number of exploratory holes (rotary core-drilled or percussion drilled) marked as instructed by the Employer's Agent shall be measured. The rate shall cover all costs incurred in complying with the requirements of **Clause 0**.

- d) Providing and erecting core box shed..... Unit : m<sup>2</sup>

The overall area of the shed as shown on the Drawings shall be measured. No separate measurement shall be made for foundation excavations, placing the concrete footings and providing locks and keys.

- e) Plugging exploratory holes..... Unit : m

The length of holes plugged as instructed by the Employer's Agent shall be measured. No distinction shall be made between different hole sizes. A distinction shall be made for holes situated in a concrete structure. The rate shall include for the use of a tremie pipe below the water table.

- f) Clearing clogged holes for plugging purposes..... Unit : m

The length of clogged holes cleared by means of rotary percussion equipment as ordered by the Employer's Agent shall be measured. No distinction shall be made between different hole sizes. Setting up plant and equipment shall be measured in terms of **Clause 0**.

- g) Grouting of holes for stabilisation..... Unit : Sacks

The number of 50 kg sacks of cementitious material approved or instructed by the Employer's Agent as being necessary for grouting of the sections of any hole for the stabilisation of unstable sidewalls shall be measured. The rate shall include all costs for the supply of all materials, labour, tools, plant and equipment, preparation and insertion of the grout. Redrilling through set grout shall be measured in terms of the appropriate clauses in this Specification (Particular Specification PI: Drilling).



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**PROJECT SPECIFIC OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION**

**FOR**  
**CONSTRUCTION OF KEMPSDALE DAM WALL**

**CONTRACT No. HGDM823/HGDM/2022**

**MANAGED ON BEHALF OF**



**HARRY GWALA DISTRICT MUNICIPALITY  
(THE “EMPLOYER”)**

**HARRY GWALA DISTRICT MUNICIPALITY  
CONSTRUCTION OF KEMPSDALE DAM WALL**

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**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:

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**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
OHSA	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

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**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 workplace 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

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**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 cognizance 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 Mandatary Agreement in terms of Section 37.2 of the OHSA 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

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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 OHS Act, 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 OHS Act S.37.2 Mandatory 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.



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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.

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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 contact 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.

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### **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.

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**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.

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### **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.

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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 85dB.

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.

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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.

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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, 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.



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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

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- 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.

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**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.

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**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;

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- 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
	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

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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 Principal 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 footwear, 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.

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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 cover all costs 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.

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## 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 "No" the rating will be 0	
If the answer is 'not applicable' it will be noted as n/a	
If the answer is "Yes" 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.



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**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 preempt 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) • Proof of Competency provided					
3.	CR 8 (1) and (2)	Designation of Construction Manager and Subordinate Person(s) • Proof of Competency provided					
4.	OHSA S. 17; GAR 7	• H&S Representatives appointed • Monthly inspections completed • Representation from Contractors					
5.	OHSA S. 18; GAR 5	• H&S Committee appointed • Minutes on file • H&S representatives reports discussed • Incidents discussed • Signed by Chair • Evidence of minutes noted					
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>					

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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					

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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)  OHS 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.	OHS 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>					

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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>					

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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>					

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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>					

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ITEM	Legal /SPEC Ref	RECORDS TO BE KEPT	SCORE	COMMENTS	By whom	Completion Date	Contractor Close out
		<ul style="list-style-type: none"> <li>• Emergency co-ordinator appointed</li> <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>					

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<b>RESPONSIBILITY</b>	<b>SIGNATURE</b>	<b>DATE</b>
<b>H&amp;S AGENT SIGNATURE:</b>		
<b>PC SIGNATURE:</b>		
<b>DESIGNER SIGNATURE:</b>		
<b>CLIENT SIGNATURE:</b>		



## 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.

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**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:
1	GENERAL ACTIVITIES FOR THE MONTH  (detail each area of work)		
2	NUMBER OF WORKERS (permanent and local, contractors)		
3	TRAINING DONE (supplier, no of people, type)		
4	INCIDENTS / ACCIDENT  (list number and details, attach reports)		
6	NON-CONFORMANCES (closed out or active)		
7	CONTRACTORS (list, approval status)		
8	AUDITS COMPLETED (internal and external)		
9	CRITICAL ISSUES		
10	GENERAL		

H&S Officer \_\_\_\_\_ Signature \_\_\_\_\_ Date: \_\_\_\_\_  
 Site Agent \_\_\_\_\_ Signature \_\_\_\_\_ Date: \_\_\_\_\_

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**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

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**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				

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	(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:

**Not supplied or not adequate**                      **0**  
**Supplied and complete**                              **1**

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	

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	4. At least one copy of minutes of previous Occupational Health and Safety Committee meetings;		<b>1</b>	
	5. Incident Investigation Reports for other projects of a similar nature undertaken by the tenderer		<b>1</b>	
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		<b>1</b> <b>1</b> <b>1</b> <b>1</b>	
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		<b>1</b> <b>1</b> <b>1</b> <b>1</b>	
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		<b>1</b> <b>1</b> <b>1</b> <b>1</b>	
	<b>FINAL SCORE</b>		<b>17</b>	



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**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	
OHS 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>		

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If a section is not applicable, then it must be deleted from the score sheet and the total score reduced.

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**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;

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- 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.

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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.** \_\_\_\_\_

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# HARRY GWALA DISTRICT MUNICIPALITY



## CONSTRUCTION OF KEMPSDALE DAM WALL

**CONTRACT No. HGDM823/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
  - Steel Pipeline
- Building Works
- Mechanical & Electrical fittings
- Manholes

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 Quality Control Assurance Plan (QCAP) 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 QCAP. 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 Quality Control (QC) 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 QC 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 but not limited to:
  - Pipework
    - HDPE
    - STEEL
  - 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 HDPE 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 – HDPE (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.

**3.2**

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).

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**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**:

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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 QCA 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 QCA 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.

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**PART C4: SITE INFORMATION**

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## PART C4: SITE INFORMATION

### C4.1 LOCALITY PLAN

The Locality of the site is as per the attached Locality Plan which is part of the list of Tender drawings.

#### C4.1.1 Access

Table below shows the location of the area which the construction works will be conducted.

No	Area	Location	
		Longitude	Latitude
1	Kempsdale Dam	29°27'23.7"E	30°32'04.4"S
2	Pumpstation	29°26'53.99"E	30°32'2.48"S

### C4.2 CONDITIONS ON SITE

A brief description of the site conditions is given under this section.

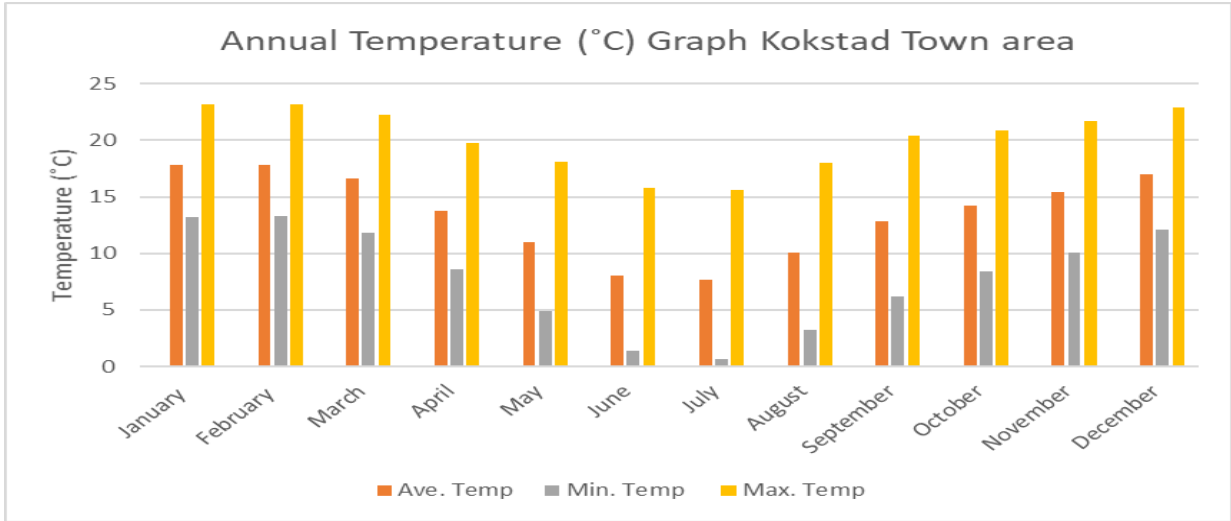
#### C4.2.1 Nature of Ground and Subsoil Conditions

A Geotech investigation has been conducted and will be made available to prospective bidders upon request. 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.

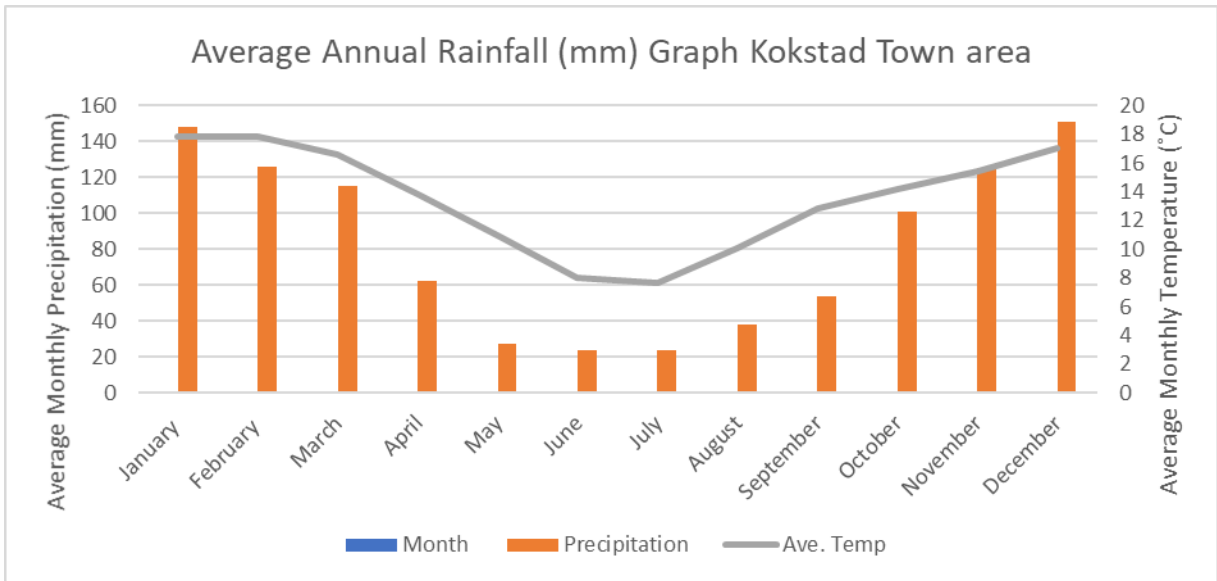
#### C4.2.2 Weather Conditions

The average annual temperature is 13.5 °C in Greater Kokstad Local Municipality. The warmest month of the year is January, with an average temperature of 17.8 °C. July is the coldest month, with temperatures averaging 7.7 °C. The average temperatures for Greater Kokstad Local Municipality are shown below.





The summers are much rainier than the winters in Greater Kokstad LM. The annual precipitation here averages around 995 mm. The driest month is July, with 24 mm of rainfall. The greatest amount of precipitation occurs in December, with an average of 151 mm. The average rainfall records are shown below.



**C4.2.3 Limitations**

The following limitations characterise the site of the raising of Kempdale dam with CVC and construction of associated apertures

- 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.

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