

DUE AT 11:00 ON

(06 JUNE 2019)

DWS06-0419 (WTE)

THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

SUBMIT BID DOCUMENTS TO:

POSTAL ADDRESS:
DIRECTOR-GENERAL:
WATER AND SANITATION
PRIVATE BAG X313
PRETORIA, 0001

OR

TO BE DEPOSITED IN:
THE BID BOX AT THE ENTRANCE
OF ZWAMADAKA BUILDING
157 FRANCIS BAARD STREET
PRETORIA, 0001

Compulsory Briefing Session

Date: 14 May 2019

Time: 13:30

Venue: Clanwilliam dam Site Office

BIDDER: (Company Address OR Stamp)

COMPILED BY: CONSTRUCTION

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

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- (a) Schedules to be submitted:
 - Schedule of plant and equipment
 - Schedule of similar work undertaken(Drilling and Blasting services for dam foundation excavation & slope protection)
 - Schedule of proposed Sub-Contractors
 - Amendments proposed by tenderer
- (b) Verification documentation to be submitted to confirm 30% sub-contracting
 - B-BBEE Status Level Verification Certificate
 - Sub-Contractor Status Verification / Valid Sworn Affidavit
 - Pro-forma sub-contracting agreement signed by both parties
- (c) Contractors Certificate of Registration with CIDB 9SE
- (d) The following information shall be submitted by the contractor at tender stage:
 - The following information shall be submitted by the contractor at tender stage:
 - Method statement for Blasting (PS 2.2 & 9.1)
 - Method Statement for Rock Support (PS2.3 & 9.1)
 - Tendered contract program (PS 8.2)
 - Pro Forma Quality Management System (PS 9.2)
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DEPARTMENT OF WATER AND SANITATION

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T1. TENDERING PROCEDURES

- T1.1 PART A: INVITATION TO BID
- T1.2 PART B: TERMS AND CONDITIONS FOR BIDDING
- T1.3 CONDITIONS OF TENDER

SBD1 T1.1 PART AINVITATION TO BID

			REQUIREMENTS OF TH	IE (NAME OF DE				11.00
BID NUMBER:	DWS06	5-0419 (WTE)	CLOSING DATE: BLASTING FOR DAM	FOUNDATION	06 JUNE 2019			11:00
DESCRIPTION					EXCAVATION /	וכ טווף	LOPE PROTECT	ION FOR THE
			THE WESTERN CAPE PR			_		
			EPOSITED IN THE BID E	BOX SITUATED	AT (STREET ADD	RESS)		
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OF ZWAMADAKA	A BUILD	ING						
157 FRANCIS BA	ARD ST	REET, PRETORIA	A, 0001					
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TELEPHONE NU	MBER	012 336 7596/7	066/6544/7780/6562	TELEPHONE	NUMBER		-	1(Office Hours
FACSIMILE NUM	IBER _			FACSIMILE N			021 87205	
	E-MAIL ADDRESS bidenquirieswte@dws.gov.za E-MAIL ADDRESS Rohrsm@dws.gov.za					ws.gov.za		
	SUPPLIER INFORMATION							
NAME OF BIDDE		****						
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CERTIFICATE								
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ACCREDITED				ARE YOU A F	OREIGN BASED			
REPRESENTATI SOUTH AFRICA		Yes	□No	SUPPLIER FO	R THE GOODS		Yes	□No
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/SERVICES /WO!	RKS	[IF YES ENCLO	SE PROOF]				[IF YES, ANSWE	R PART B:3]
	E TO BII	DDING FOREIGN	SUPPLIERS					
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		E A BRANCH IN T		,	YES NC	_		
DOES THE ENTI	TY HAVE	E A PERMANENT	ESTABLISHMENT IN TH	IE RSA? ∐YES	S 🗌 NO			
DOES THE ENTI	TY HAVE	E ANY SOURCE (OF INCOME IN THE RSA	?	□YES □ NC)		
IS THE ENTITY L	IABLE II	N THE RSA FOR A	ANY FORM OF TAXATIO	N? NOT A REQUIRE	YES N	O TER FO	R A TAX COMPL	IANCE STATUS
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.								

T1.2 PART B

TERMS AND CONDITIONS FOR BIDDING

SBD1

1. BID SUBMISSION:

- 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
- 1.2. ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED—(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.
- 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
- 1.4. THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).

2. TAX COMPLIANCE REQUIREMENTS

- 2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
- 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.
- 2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.
- 2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
- 2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
- 2.6 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
- 2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PA	ARTICULARS MAY RENDER THE BID INVALID.
SIGNATURE OF BIDDER:	
CAPACITY UNDER WHICH THIS BID IS SIGNED: (Proof of authority must be submitted e.g. company resolution)	
DATE:	

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

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T1.3 CONDITIONS OF TENDER

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- 1. Issuing of documents
- 2. Queries with respect to this bid
- 3. Eligibility
- 4. Completion of Bids
- 5. Submission of Bids
- 6. Signature on Bids
- 7. Telegraphic Bids
- 8. The Department's right to decline any bid
- 9. Department is not liable for bidder's expenses
- 10. Evaluation Criteria
- 11. Rejection of bids
- 12. Results of Bids

T1.3 CONDITIONS OF TENDER

1. ISSUING OF DOCUMENTS

- (a) A complete sets of bid documents are issued to a prospective Bidder. These documents are available from the DWS website and e-Tender portal.
- (b) Bidders must satisfy themselves that the document is complete and conform to the index of this document. Should any figures or writing be indistinct or should any pages be missing from this document or should this document or the drawing(s) contain any obvious errors, the Bidders must immediately notify the Department in order to have any discrepancy rectified or clarified before submitting his bid. Such clarification will be valid only if made by the Department by means of formal amendment as described hereunder prior to the date of submission of bids. The Department may issue amendments to clarify or modify the Bid Documents. A copy of each amendment will be issued to each bidder and shall be acknowledged on the form issued with the amendments. No claim whatsoever will be entertained for faults in the bid price resulting from the above-mentioned discrepancies.
- (c) No alterations, omissions or additions shall be made to this document, but should it be deemed necessary to do so, the Bidder is at liberty to qualify his bid.
- (d) All Bidders shall be deemed to have waived, renounced and abandoned any conditions printed or written upon any stationery used by them for the purpose of or in connection with the submission of bids which are in conflict with the conditions laid down in this document.
- (e) Each page of the completed document that will be submitted should be initialled by the Bidder at the bottom of the page.

2. QUERIES WITH RESPECT TO THIS BID

Queries of a specific technical nature may be discussed personally or telephonically with M Rohrs, Telephone 021 872 0591 or may be directed in writing to: The Director: Construction Management Support, Department of Water and Sanitation, Private Bag X 323, Pretoria, 0001.

3. ELIGIBILITY

An Entity is not eligible to submit a bid if:

- (a) the bidder does not comply with the legal requirements of the Department's Procurement as stated in paragraph 10.
- (b) the Entity submitting the bid is under restrictions or has principals who are under restriction to participate in the Department's procurement due to corrupt of fraudulent practices;
- (c) the Bidder does not have the legal capacity to enter into the contract;
- (d) the Entity submitting the bid is insolvent, in receivership, 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 the foregoing;
- (e) the Bidder cannot demonstrate that he possesses the necessary professional and technical qualifications and competent, financial resources, equipment and other physical facilities, managerial capability, personnel, experience and reputation to perform the contract;
- (f) the Bidder cannot provide proof that he is in good standing with respect to duties, taxes, levies and contributions required in terms of legislation applicable to the work in the contract;
- (g) the Bidder has failed to perform on any previous contract and has been given a written notice to this effect;
- (h) the Bidder or a competent authorized representative of the Entity who submitted the tender has not attended the compulsory clarification meeting or site inspection if applicable;
- (i) the bid offer is not signed by a person authorized to sign on behalf of the Bidder;

(j) more than one bid has been submitted by a Bidder. Each Bidder shall submit only one bid for the same project, either individually as a Bidder or as a partner in a joint venture. No Entity can be a subcontractor while submitting a bid individually or as a partner of a joint venture in the same bidding process. An Entity, if acting in the capacity of subcontractor in any bid, may participate in more than one bid, but only in that capacity. A Bidder who submits or participates in more than one bid will cause all the proposals in which the Bidder has participated to be disqualified.

4. COMPLETION OF BIDS

- (a) The bid must be signed on Part A Invitation to Bid form (SBD 1) with all blanks filled in Part A Invitation to Bid and Part B Terms and Conditions for Bidding.
- (b) All forms and schedules as per section T2.1 shall be completed in full. The documents as per section T2.2 shall be submitted.
- (c) The Pricing Schedule in Section C3 of the bid document must be fully completed and priced out by the bidder. Failure to do so will deem your bid invalid.
- (d) The bid documents shall not be separated in any way nor must any pages be detached from the original documents.
- (e) Each page of the completed document that will be submitted should be initialled by the Bidder at the bottom of the page.
- (f) Not make any alterations or additions to the bid documents, except to comply with instructions issued by the Department, or necessary to correct errors made by the Bidder. All signatories to the bid offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited
- (g) Submit alternative bid offers only if a main bid offer, strictly in accordance with all the requirements of the bid documents, is also submitted. The alternative bid offer is to be submitted with the main bid offer together with a schedule that compares the requirements of the bid documents with the alternative requirements the Bidder proposes.

5. SUBMISSION OF BIDS

The Bid Document shall be completed, signed and submitted as follows:

(a) The original Bid, together with a covering letter and supporting documents, shall be sealed in an envelope endorsed:

"ORIGINAL BID DWS06-0419 (WTE) FOR BID: THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE"

and the name of the Bidder shall be clearly shown

(b) Bids sealed and endorsed as above, will be received by: The Supply Chain Management office or may be deposit in the bid box at the entrance of the ZwaMadaka Building, 157 Francis Baard Street, Pretoria and not later than 11:00 on the date stipulated on the front cover of this document.

6. SIGNATURE ON BIDS

The successful bidder will be required to submit a "Letter from the manufacturer" confirming the supply arrangement within 14 days after the approval of the bid. Failure to do so will invalidate the Bid.

If the bid is submitted by joint venture of more than one person and/or Companies and/or firms it shall be accompanied by the following:

- (a) The original or a notarial certified copy of the original document under which such joint venture was constituted which must define precisely inter alia the conditions under which the joint venture will function, its period of duration and the participation of the several constituent persons and/or companies and/or firms.
- (b) A certificate signed by or on behalf of each participating person and/or company and/or firm authorising the person who signed the bid to do so.

7. TELEGRAPHIC BIDS

No bid forwarded by telegram, telex, facsimile, e-mail or similar apparatus will be considered.

8. THE DEPARTMENTS RIGHT TO DECLINE ANY BID

The Department may accept or decline 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 Department shall not accept or incur any liability to a tenderer for such cancellation and decline. The Department does not bind itself to accept the lowest or any bid.

9. DEPARTMENT NOT LIABLE FOR BIDDER'S EXPENSES

The Department will not be held liable for any expenses incurred in preparing and submitting bids, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

10. EVALUATION CRITERIA

Bids will be evaluated in accordance with the new Preferential Procurement Regulations, 2017, using 90/10 preference points system as prescribed in the Preferential Procurement Policy Framework Act (PPPFA, Act 5 of 2000. The lowest acceptable bid will score 90 points for price and a maximum of 10 points will be awarded for attaining the Broad-Based Black Economic Empowerment (B-BBEE) Status Level of Contribution. Bids received will be evaluated on the four (4) phases namely Compulsory subcontracting, Administrative Compliance, Technical Evaluation and Specification Compliance and Price and Preference Points Claimed.

Phase 1:

Compulsory subcontracting

Preferential procurement regulations, 2017, regulation 9

To give effect to the Preferential Procurement Regulations, 2017 pertaining to the Preferential Procurement Policy Framework Act (Act No 5 of 2000), the prequalification criteria in terms of regulation 9 will be applicable.

Only Bidders who do have a 30 % sub-contracting agreement to an 51 % black owned EME or QSE will be considered for this bid.

Phase 2:

Administrative Compliance:

Bidders are required to comply with the following listed below:

No	Criteria	Yes	No
1	Companies must be registered with National Treasury's Central Supplier Database. Provide MAAA number on SBD1		
2	Tax compliant with SARS (to be verified through CSD and SARS). Attach a copy of Tax Clearance certificate and PIN.		
3	Active registration with Company Intellectual Property Commission (to be verified through CSD and CIPC). Attach copy of CIPC / CIPRO certificate.		
4	The Bid must be signed by a director of the company or a duly authorised person and proof of such authority must be submitted with the bid.		
6	Complete, sign, submit SBD 1, SBD 3.2, SBD 4, SBD 6.1, SBD 8, SBD 9		

Mandatory requirements

Failure to submit any of the documents listed below will render your bid non-responsive and will be disqualified.

Yes - list the relevant documents required on the table below

No	Criteria	Yes	No
1	Attendance of compulsory briefing session		
2	Contractors Certificate of Registration with CIDB 9SE		
3	Valid letter of Good Standing with the Compensation Commissioner in terms of the Compensation for Occupational Injuries and Diseases Act No 130 of 1993		
4	Certified copy of UIF certificate or letter of good standing		

Phase 3:

Technical Evaluation and Specification Compliance:

The bid will be evaluated using the below criteria. Bids that fails to achieve a minimum score of 77 will not be considered for phase 4 of the evaluation. If the Bidder doesn't score the minimum points on each criteria, the Bidder will be disqualified.

NO.	CRITERIA	DELIVERABLES	WEIGHTING/ JUDGEMENT PER CRITERIA	MAXIMUM POINTS
1.	Schedule of Plant and Equipment	A fully completed and signed schedule list of major items of relevant equipment that are in good working condition that the bidder own or will lease and have for this contract must be provided. The following must be presented on the schedule to be provided:	1. Max 10 2. Min 5 4	Total for criteria 10
		Item description		
		 Type and size 		1
		Capacity		
		Quantity		
		Year of manufacture		
		Present financial liability		
		Is the schedule of plant/equipment in line with a method statement	3	
		Provide the locations where the Plants may be inspected related to contactable references	3	
2.	Past Experience	Contactable reference (description of the project, period of the contract, contract amount and project manager for reference)	1. Max 15 2. Min 7	Total for criteria
		Provide a minimum of 3 contactable references of clients		
		Bidders must submit signed reference letter(s) from previous clients/employer.		
		Note that only completed projects will be accepted for evaluation.		
		Relevant work experience in water industry:		
		Bulk unconfined surface blasting.		
		Controlled basting to dimension tolerances		
		Controlled blasting to vibration tolerances		
		Pre-split blasting		
		Foundation trim blasting		
		Reference letter(s) must indicate any of the above listed projects completed by the bidder. Points allocation will be as follow:		
		10 or more completed projects	15	
		8-9 Completed projects	12	
		6-7 Completed projects	9	-
		6-7 Completed projects 4-5 Completed projects	6	1
		2-3 Completed projects	3]
		Less than 2 completed projects	0]

NO.	CRITERIA	DELIVERABLES	WEIGHTING/ JUDGEMENT PER CRITERIA	MAXIMUM POINTS
3.	Method Statement for drilling and blasting	It is a requirement that the Contractor will submit a preliminary Method Statement for Drilling and Blasting for each section of work in which the following is clearly stated:		Total for criteria
		Proposed phases of blasting;	Max 10 Min 5	
		The intended blasting methods ;	Max10 Min 5	,
		The type of explosives to be used for different blasting methods and the respective data sheets;	Max10 Min 5	
		The intended drill pattern to be used for different blasting methods; and	Max 10 Min 5	-
18		The intended method of Measurement. NB: Highlight all the risks and the treatments of the risks that may be encountered during drilling and blasting foundation activities. Points allocation from 2 – 10 per section of work as broken above, for no submission of information zero (0):	Max10 Min 5	
4.	Method Statement for Rock support	It is a requirement that the Contractor will submit a preliminary Method Statement for Rock support for the:		Total for criteria
		Installation of rockbolts;	Max 10 Min 5	
		Shotcrete application; and	Max 10 Min 5	
		 Fixing of double twisted wire mesh to the rock face NB: Highlight all the risks and the treatments of the risks that may be encountered during geotechnical investigations and during foundation activities Points allocation from 2 – 10 per section of work as broken above, for no submission of information zero (0); 	Max 10 Min 5	
5.	Quality Management System for Drilling and blasting and Rock support	Provide a Project Quality plan with: Inspection and test plan for each activity in which the sequence of events are listed with the applicable conformance criteria, standards, specifications and drawings as well as the frequency and records of inspections with holding points Provide sample of record sheets	1. Max 10 2. Min 5	Total for criteria 10

NO.	CRITERIA	DELIVERABLES	WEIGHTING/ JUDGEMENT PER CRITERIA	MAXIMUM POINTS
6.	Health and Safety Plan	Provide Health and Safety Management System for all the work to be carried out with specific reference to:	1. Max 10 2. Min 5	Total for criteria
		Organogram & legal appointments	4	
		5.11.50.1	4	1
			-	
		File structure of documentation	2	
7.	Ability and Capability	Demonstrated skills and experience of each key personnel for this project by;	1. Max 10 2. Min 5	Total for criteria
		Submission of organization and staffing proposals with a 1 page resume of each key project team member indicating qualifications, experience, accreditation / affiliation)	2	30
		Proof of qualifications, experience, accreditation / affiliation are required for:		
		Professional Blast designer	2	
		Construction Manager	2	
		Blaster	2	
		Drill rig operators	2	
		Professional Blast designer	1. Max 5 2. Min 2	
		6 Years or more experience	5	1
		5 Years or more experience	4]
		4 Years or more experience	3]
		3 Years or more experience	2	
	<u> </u>	2 Years or more experience	1	<u> </u>
		Construction Manager	1. Max 5 2. Min 2	
		6 Years or more experience	5	
		5 Years or more experience	4	
		4 Years or more experience	3	
		3 Years or more experience	2	
	<u> </u>	2 Years or more experience	1	
		Blaster(s)	1. Max 5 2. Min 2	
		6 Years or more experience	5	
		5 Years or more experience	4	
		4 Years or more experience	3	
		3 Years or more experience	2	
		2 Year or more experience	1	

NO. CRITERIA	DELIVERABLES	WEIGHTING/ MA JUDGEMENT PO PER CRITERIA	INTS
	Drill rig operators	1. Max 5 2. Min 2	
	5 Years or more experience	5	
	4 Years or more experience	4	
	3 Years or more experience	3	
	2 Years or more experience	2	
	1 Year or more experience	1	· · · · · · · · · · · ·
TOTAL		Max 155 Min 77	

Phase 4:

Evaluation of Price and Preference Points Claimed:

During this phase, bid proposals that passed the phase 3 will be further evaluated based on the 90/10 preference points system in accordance with the PPPFA Act, where 90 points will be attained in respect of price and 10 points will be awarded to a bidder for attaining the B-BBEE Status Level of Contribution.

Failure on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for B-BBEE status level of contribution are not claimed.

Proof includes original and valid B-BBEE Status Level Verification Certificates or certified copies thereof together with their price quotations, to substantiate their B-BBEE rating claims.

Bidders who qualify as EMEs or QSEs are only required to submit a sworn affidavit signed by the company representative and attested by a Commissioner of oaths, confirming its annual total revenue and level of Black ownership.

B-BBEE certificate must be a certified copy and it must be valid on or before the closing date of the invitation in order for a bidder to qualify for the points to be claimed.

The original Sworn Affidavit endorsed or signed off by the commissioner of oath must be the original document not a copy and it must be valid on or before the closing date of the invitation in order for a bidder to qualify for the points to be claimed.

In bids where there is Consortia/Joint Ventures, a consolidated valid B-BBEE certificate must be submitted.

NB: A Copy of certified copy of B-BBEE status level contributor certificate will not be accepted.

NB: A Copy of a sworn affidavit will not be accepted.

BIDDERS ARE REQUESTED NOT TO MAKE A COPY OF THE DOCUMENT WHICH HAS ALREADY BEEN CERTIFIED FOR TENDERING PURPOSES!!

11. REJECTION OF BID

Bids not complying with the above-mentioned requirements and specifications will be regarded as incomplete and will not be considered.

12. RESULTS OF BIDS

Results of non-acceptance of bids will be sent to individual unsuccessful bidders. Particulars of accepted bids are published weekly in the Government Tender Bulletin.

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

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T2. FORMS AND SCHEDULES TO BE COMPLETED BY TENDERER

T2.1 FORMS TO BE COMPLETED

Declaration of interest (SBD 4)

Preference points claim in terms of the preferential procurement regulation, 2017 (SBD6.1)

Declaration of bidders past supply chain management practices (SBD 8)

Certificate of independent bid determination (SBD 9)

T2.2 DOCUMENTS TO BE SUBMITTED

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 - Pro Forma Health and Safety Plan (PS 11.1)

T2.1 FORMS TO BE COMPLETED

CERTIFICATE OF ATTENDANCE AT SITE MEETING

This is to certify that (tenderer)	
of(address)	
	was represented by the person
named below at the compulsory meeting held for a	all tenderers at (location)
on(date)	starting at (time)
	is to acquaint myself with the site of the works and / or matters incidental to in order for me to take account of everything necessary when compiling
a artifolding of person attending the meeting.	
Name:	Signature:
Capacity:	
Attendance of the above person at the meeting	is confirmed by the Employer's representative, namely:
Name:	Signature:
Canacity:	Date and Time:



ANNEXURE B

SBD 4 DECLARATION OF INTEREST

- Any legal person, including persons employed by the state¹, or persons having a kinship with persons employed by the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid (includes an advertised competitive bid, a limited bid, a proposal or written price quotation). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the state, or to persons connected with or related to them, it is required that the bidder or his/her authorised representative declare his/her position in relation to the evaluating/adjudicating authority where-
 - the bidder is employed by the state; and/or
 - the legal person on whose behalf the bidding document is signed, has a relationship with persons/a person who are/is involved in the evaluation and or adjudication of the bid(s), or where it is known that such a relationship exists between the person or persons for or on whose behalf the declarant acts and persons who are involved with the evaluation and or adjudication of the bid.

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dentity Number:	1 .					L				
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osition occupied in the	Compan	y (direct	tor, trus	tee, sr	nareno	ider-,	mem	per):		
Registration number of	company,	enterpr	ise, clo	se cor	poratio	n, pa	rtners	hip ag	reem	ent
Registration number of	company,	enterpr	rise, clo	se cor	poratio	n, pa	rtners	hip ag	reem	en
egistration number of	company,	enterpr	rise, clo	se cor	poratio	n, pa	rtners	hip ag	reem	en
egistration number of	company,	enterpr	ise, clo	se cor	poratio	on, pa	rtners	hip ag	reem	en

¹"State" ı	means – (a) any national or provincial department, national or the meaning of the Public Finance Management At (b) any municipality or municipal entity; (c) provincial legislature; (d) national Assembly or the national Council of provin (e) Parliament.	ct, 1999 (Act No. 1	tity or consi of 1999);	itutional institution within
²"Shareh enterpris	older" means a person who owns shares in the compa e or business and exercises control over the enterprise.	ny and is actively	involved in	the management of the
2.7	Are you or any person connected with the bidder presently employed by the state?	,	YES	NO
2.7.1	If so, furnish the following particulars:		_	
	Name of person/director/trustee shareholder/ member:			
	Name of state institution at which you or the person connected to the bidder is employed:			
	Position occupied in the state institution:	 		
	Any other particulars:			
2.7.2	If you are presently employed by the state, did you obtain the appropriate authority to undertake remunerative work outside employment in the public sector?		YES	NO
2.7.2.1	If yes, did you attach proof of such authority to the bid document?		YES	NO
	(Note: Failure to submit proof of such authority, where applicable, may result in the disqualification of the bid.)			
2.7.2.2	If no, furnish reasons for non-submission of such proof:	· · · · · · · · · · · · · · · · · · ·		<u> </u>
	-			
	•			
		_		

The names of all directors/trustees/shareholders/members, their individual identity numbers, tax reference numbers and, if applicable, employee/PERSAL numbers must be indicated in paragraph

1.6.1

2.8	Did you or your spouse, or any of the company's directors/trustees/shareholders/members or their spouses conduct business with the state in the previous twelve months?	YES	NO
2.8.1	If so, furnish particulars:		
2.9	Do you, or any person connected with the bidder, have any relationship (family, friend, other) with a person employed by the state and who may be involved with the evaluation and or adjudication of this bid?	YES	NO
2.9.1	If so, furnish particulars		
			·
2.10	Are you, or any person connected with the bidder, aware of any relationship (family, friend, other) between any other bidder and any person employed by the state who may be involved with the evaluation and or adjudication of this bid?	YES	NO
2,10.1	If so, furnish particulars.		
	-	<u> </u>	
	•		
2.11	Do you or any of the directors/trustees/ shareholders/members of the company have any interest in any other related companies whether or not they are bidding for this contract?	YES	NO
2.11.1	If so, furnish particulars:		
	-		
	-		
	-		

3 Full details of directors/trustees/members/shareholders

	Full Name	Identity Number	Personal Income Tax Reference Number	State Employee Number/Persal Number
		·		
4	DECLARATION I, THE UNDERSIGNED (I			
36	CERTIFY THAT THE INF	ORMATION FURNISH IAT THE STATE MAY	HED IN PARAGRAPHS 2 an REJECT THE BID OR ACT	d 3 ABOVE IS AGAINST ME SHOULD
	0:		Date	
	Signature		Date	
,	Position		Name of bidde	er .

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017

This preference form must form part of all bidsinvited. It contains general information and serves as a claim form forpreference points forBroad-Based Black Economic Empowerment (B-BBEE) Status Levelof Contribution

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF B-BBEE, AS PRESCRIBED N THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017.

1. GENERAL CONDITIONS

- 1.1 The following preference point systems are applicable to all bids:
 - 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

- a) The value of this bid is estimated to not exceed R50 000 000 (all applicable taxes included) and therefore the 80/20 preference point system shall be applicable; or
- 1.3 Points for this bid shall be awarded for:
 - (a) Price; and
 - (b) B-BBEE Status Level of Contributor.
- 1.4 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	80
B-BBEE STATUS LEVEL OF CONTRIBUTOR	20
Total points for Price and B-BBEE must not exceed	100

- 1.5 Failure on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for B-BBEE status level of contribution are not claimed.
- 1.6 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.

2. DEFINITIONS

- (a) "B-BBEE" means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;
- (b) "B-BBEE status level of contributor" means the B-BBEE status of an entity in terms of a code of good practice on black economic empowerment, issued in terms of section 9(1) of the Broad-Based Black EconomicEmpowerment Act;
- (c) "bid" means a written offer in a prescribed or stipulated form in response to an

invitation by anorgan of state for the provision of goods or services, through price quotations, advertisedcompetitive bidding processes or proposals;

- (d) "Broad-Based Black Economic Empowerment Act" means the Broad-Based Black EconomicEmpowerment Act, 2003 (Act No. 53 of 2003);
- (e) "EME" means an Exempted Micro Enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;
- (f) "functionality" means the ability of a tenderer to provide goods or services in accordance with specifications as set out in the tender documents.
- (g) "prices" includes all applicable taxes less all unconditional discounts;
- (h) "proof of B-BBEE status level of contributor" means:
 - 1) B-BBEE Status level certificate issued by an authorized body or person;
 - 2) A sworn affidavit as prescribed by the B-BBEE Codes of Good Practice;
 - 3) Any other requirement prescribed in terms of the B-BBEE Act;
- (i) "QSE" means a qualifyingsmall business enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;
- (j) "rand value" means the total estimated value of a contract in Rand, calculated atthe time of bid invitation, and includes all applicable taxes;

POINTS AWARDED FOR PRICE

3.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

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

80/20 or 90/10

$$Ps = 80\left(1 - \frac{Pt - P\min}{P\min}\right)$$
 or $Ps = 90\left(1 - \frac{Pt - P\min}{P\min}\right)$

Where

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

4. POINTS AWARDED FOR B-BBEE STATUS LEVEL OF CONTRIBUTOR

4.1 In terms of Regulation 6 (2) and 7 (2) of the Preferential Procurement Regulations, preference points must be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table below:

B-BBEE Status Level of Contributor	Number of points (90/10 system)	Number of points (80/20 system)
1	10	20
2	9	18
3	6	14
4	5	12
5	4	8

6	3	6
7	2	4
8	1	2
Non-compliant contributor	0	0

5.1	Bidders who claim points in respect of B-BBEE Status Level of Contribution mus
	complete the following:

6.	B-BBEE	STATUS	LEVEL	OF	CONTRIBUTOR	CLAIMED	IN	TERMS	OF
	PARAGR	APHS 1.4	AND 4.1						

ponto/	6.1	B-BBEE Status Level of Contributor: points)	×	=	(maximum of 10 or 20
--------	-----	---	---	---	----------------------

(Points claimed in respect of paragraph 7.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

7.1 Will any portion of the contract be sub-contracted?

(Tick applicable box)

YES	NO

7.1.1 If yes, indicate:

•	0/
i)	What percentage of the contract will be subcontracted%
ii)	The name of the sub-contractor
	The B-BBEE status level of the sub-contractor
iv)	Whether the sub-contractor is an EME or QSE
-	(Tick applicable box)

YES NO

v) Specify,by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations,2017:

Designated Group: An EME or QSE which is at last 51% owned by:	EME √	QSE
Black people		
Black people who are youth		
Black people who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME Any QSE		

8. DECLARATION WITH REGARD TO COMPANY/FIRM

8.1	Name of company/firm:
8.2	VAT registration number:
8.3	Company registration number:
8.4	TYPE OF COMPANY/ FIRM
	Partnership/Joint Venture / Consortium One person business/sole propriety Close corporation Company (Pty) Limited [TICK APPLICABLE BOX]
8.5	DESCRIBE PRINCIPAL BUSINESS ACTIVITIES
8.6	COMPANY CLASSIFICATION
	Manufacturer Supplier Professional service provider Other service providers, e.g. transporter, etc. [TICK APPLICABLE BOX]
8.7	Total number of years the company/firm has been in business:
8.8	I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contributor indicated in paragraphs1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:
	i) The information furnished is true and correct;
	 The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
	iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;
	iv) If the B-BBEE status level of contributor has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the

(a) disqualify the person from the bidding process;

purchaser may, in addition to any other remedy it may have -

- (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 bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a

fraudulent basis, be restricted by the National Treasury 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.

SIGNATURE(S) OF BIDDERS(S)
DATE:
ADDRESS



SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

This Standard Bidding Document must form part of all bids invited.

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.

The bid of any bidder may be disregarded if that bidder, or any of its directors have-

abused the institution's supply chain management system; committed fraud or any other improper conduct in relation to such system; or failed to perform on any previous contract.

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

Hem	Question		
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?	Yes	No
	(Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the audi alteram partem rule was applied).		
	The Database of Restricted Suppliers now resides on the National Treasury's website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.		
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)?	Yes	No
	The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.		

4.2.1	If so, furnish particulars:	
4.3	Was the bidder or any of its director court outside of the Republic of Sou past five years?	s convicted by a court of law (including a the Africa) for fraud or corruption during the
4.3.1	If so, furnish particulars:	
4.4		er and any organ of state terminated Yes No nt of failure to perform on or comply with
4.4.1	If so, furnish particulars:	
		10
		SBD 8
CERT	IFICATION	
I, THE I	UNDERSIGNED (FULL NAME)	
CERTIF CORRE		SHED ON THIS DECLARATION FORM IS TRUE AND
I ACCE ME SH	PT THAT, IN ADDITION TO CANCELL OULD THIS DECLARATION PROVE	ATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST TO BE FALSE.
	Signature	Date
<u> </u>	Position	Name of Bidder



SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

- This Standard Bidding Document (SBD) must form part of all bids invited.
- 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). Collusive bidding is a pe se prohibition meaning that it cannot be justified under any grounds.
- 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.
 - 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.
- This SBD 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.
- In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

Includes price quotations, advertised competitive bids, limited bids and proposals.

² Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:				
		(Bid Number and Description)		
in respon	se to th	e 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, o	n beha		that:	
		(Name of Bidder)		
1	I have	read and I understand the contents of this Certificate;		
2	I unde	erstand that the accompanying bid will be disqualified if this Certificate is found not to be complete in every respect;	e true	
3		authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on bidder;	behalf	
4	Each to dete	person whose signature appears on the accompanying bid has been authorized by the ermine the terms of, and to sign the bid, on behalf of the bidder;	bidder	
5	shall i	e purposes of this Certificate and the accompanying bid, I understand that the word "comp nclude any individual or organization, other than the bidder, whether or not affiliated w r, who:	etitor" ith the	
	(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 qualific abilities or experience; and	ations,	
	(c)	provides the same goods and services as the bidder and/or is in the same line of bu as the bidder	siness	

- 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 consortium³ will not be construed as collusive bidding.
- 7 In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - (a) prices:
 - (b) geographical area where product or service will be rendered (market allocation)
 - (c) methods, factors or formulas used to calculate prices;
 - (d) the intention or decision to submit or not to submit, a bid;
 - (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
 - (f) bidding with the intention not to win the bid.
- 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.
- 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.

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.

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 (a) SCHEDULES TO BE SUBMITTED

SCHEDULE OF PLANT AND EQUIPMENT

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

) Details of major equipment that	t is owne	d by	me / us ar	d immediatel	y avail	able for th	nis contra	ict.
ESCRIPTION (type, size, capacity etc)	QUANTI	TY	YEAR OF	MANUFACTUF	RE P	RESENT F	INANCIAL	. LIABILITY
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					+			
					+			-
<u>.</u>	ļ						<u></u>	
ach additional pages if more space	is require	d						
	-			l	. 4	.e	4	
Details of major equipment that ESCRIPTION (type, size, capacity etc)	will be n	QU	, or acquir	HOW ACQUI	RED	my i our	tender is	accepted
ESCRIPTION (type, Size, capacity etc)				HIRE/BUY	801	IRCE		
				HIKE/BUT	300	INOL		
					-			
				<u></u>	1			
					-			
	1			<u></u>	-			
tach additional pages if more space i	s require	d						
e Tenderer undertakes to bring onto si	te without	add	litional cost	to the Employ	er any	additional	plant not	listed but y
y be necessary to complete the contract	ct within th	e sp	ecified con	tract period.				
ilure to complete this form properly	and corre	ctly	, will lead	to the conclus	ion th	at the ten	derer do	es not hav
cessary plant and equipment resour	ces at his	dis	posal, whic	ch will prejudi	ce his	tender.		
3NATURE:				DATE:				
person authorised to sign on behalf of	the Tende	rer)						

<u>SCHEDULE OF SIMILAR WORK UNDERTAKEN</u> (Drilling and Blasting services for dam foundation excavation & slope protection)

The following is a statement of work of similar nature recently successfully executed by myself / ourselves:

EMPLOYER: CONTACT PERSON AND TELEPHONE NUMBER	CONSULTING ENGINEER: CONTACT PERSON AND TELEPHONE NUMBER	NATURE OF WORK	VALUE OF WORK (inclusive of VAT)	DATE COMPLETED OR EXPECTED TO BE COMPLETED

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

SCHEDULE OF PROPOSED SUBCONTRACTORS (At least 30%)

PROPOSED SUBCONTRACTORS | AND CIDB CLASSIFICATION

NAMES AND ADDRESSES OF

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

COMPANY REGISTRATION No

If I/we am/are awarded a contract I/we agree that this notification does not change the requirement for me/us to submit the names of proposed subcontractors in accordance with requirements of the contract for such appointments. If there are no such requirements in the contract, then your written acceptance of this list shall be binding between us.

DESCRIPTION OF WORK TO

BE EXECUTED BY

		SUBCONTRACTOR	
		· ·	
for an analysis of the Bornel Berlin (1997) and the State (1997) and the			
NOTE: It is a requirement of the above must be provided w	nis contract that the names of prith the Tender.	proposed subcontractors for t	he work listed
above must be provided in			
SIGNATURE:(of person authorised to sign on beha		·	

VERIFICATION DOCUMENTATION

The Tenderer shall attach the following documentation in support of the pre-qualification specification of this bid:

original and valid B-BBEE Status Level Verification Certificate or an originally certified copy thereof, issued by accredited Verification Agency/s by SANAS or 11.2.3.2 Registered Auditor approved by Independent Regulatory Board of Auditor (IRBA), together with their bid to substantiate their B-BBEE rating claims.

A trust, consortium or joint venture (including unincorporated consortia and joint ventures) must submit a consolidated B-BBEE Status Level Verification certificate to substantiate their B-BBEE rating claims.

An EME is required to submit a sworn affidavit confirming their annual total revenue of R10 million or less and level of black ownership to substantiate their EME rating claims.

An EME that is regarded as a Specialized Enterprise is required to submit a sworn affidavit confirming their annual turnover/allocated budget/ gross receipt of R10 million or less and level of percentage of black beneficiaries to substantiate their EME rating claims.

A QSE is required to submit a sworn affidavit confirming their annual total revenue of between R10 million and R50 million and level of black ownership or a B-BBEE level verification certificate to substantiate their QSE rating claims.

<u>NOTE</u>: It is a requirement of this contract that the verification documentation of the names of proposed subcontractors for the work must be provided with the Tender.

010,11111111111111111111111111111111111	DATE:	
(of person authorised to sign on behalf of the Tenderer)		

CONTRACTOR'S CERTIFICATE OF REGISTRATION WITH CIDB

with my	ed hereto is my / our Contractor's Certificate of Regist y / our tender document will lead to the conclusion t re not eligible to tender.	stration with CIDB. My failure to submit the certificate that I am / we are not registered with the CIDB and
[Note:	Only certificates for the specified category <u>9SE</u> are applications by CIDB, will only be acceptable if it is certificate will be issued before award of the contract.]	certain that the application will be successful and a
	FURE:on authorised to sign on behalf of the Tenderer)	DATE:

TENDERED CONTRACT PROGRAMME

activi	e Tenderer shall attach a preliminary programme reflecting the p ivities comprising the work for this Contract. The programme sh ntract, requirements of the Project Specifications and with all oth	iall be in accordance with the information supplied in the
[Note	otes:	
(1)		egarded as an alternative offer, unless it is listed it
SIGN (of p	SNATURE: person authorised to sign on behalf of the Tenderer)	DATE:

METHOD STATEMENTS

The Tenderer shall attach the preliminary method statements with the required information as specified.

It is a requirement that the Contractor will submit a preliminary Method Statement for drilling and blasting for each section of work in which the following is clearly stated:

- Proposed phases of blasting;
- The intended blasting methods;
- The type of explosives to be used for different blasting methods and the respective data sheets;
- The intended drill pattern to be used for different blasting methods; and
- The intended method of Measurement.

It is a requirement that the Contractor will submit a preliminary Method Statement for rock support for the:

- Installation of rockbolts:
- Shotcrete application; and
- Fixing of double twisted wire mesh to the rock face

The above method statements must be submitted with the tender to evaluate the ability of the Contractor to perform the work according to specification.

CONTRACTOR'S HEALTH AND SAFETY DECLARATION

In terms of Clause 4(4) of the OHSA 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 OHSA 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 If the undersigned hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No 181 of 1993), and the OHSA 1993 Construction Regulations 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 OHSA 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 OHSA 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 OHSA 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 OHSA 1993 Construction Regulations 2003 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)		

ADDITIONAL INFORMATION

The following	documentation	to	be	included	after	this	page:
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- Pro Forma Quality Management System (PS 9.2)
 Pro Forma Health and Safety Plan (PS 11.1)

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

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

C1. CONTRACT DATA

- C1.1 GENERAL CONDITIONS OF CONTRACT
- C1.2 SPECIAL CONDITIONDS OF CONTRACT
- C1.2.1 GENERAL
- C1.2.2 ADMENDMENT TO THE GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS. (3rd Edition 2015)(GCC)
- C1.3 CONTRACT SPECIFIC DATA

C1.1 GENERAL CONDITIONS OF CONTRACT

The Contract shall be governed by the "General Conditions of Contract for Construction works, Third Edition, 2015, published by the South African Institution of Civil Engineering, Private Bag X200, Halfway House, 1685 and is obtainable from www.saice.org.za. It is supplemented with the Special Conditions of contract for the GCC and the Contract Data for GCC.

The only variations from these General Conditions of Contract shall be given in the Special conditions of Contract below. Whenever there is a conflict, the provisions in the Special Conditions of Contract shall prevail.

C1.2 SPECIAL CONDITIONS OF CONTRACT

C1.2.1 GENERAL

These Special Conditions of Contract (SCC) form an integral part of the Contract. The Special Conditions of Contract shall amplify, modify or supersede, as the case may be, to the extent specified below, and shall take precedence and shall govern.

C1.2.2 AMENDMENT TO THE GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS. (3rd Edition 2015)(GCC)

The clauses of the Special Conditions hereafter are numbered "SCC" followed in each case by the number of the applicable clause or sub clause in the General Conditions of Contract for Construction Works (3rd Edition 2015), and the applicable heading. A new special condition, that has no relation to the existing clauses, is introduced by a number that follows after the last clause number in the General Conditions, and an appropriate heading.

The pro forma annexures included in the General Conditions of Contract for Construction Works (3rd Edition 2015) are deleted for the purpose of this Contract and are replaced with the forms bound into this document

SCC 1(1) Definitions

The definitions contained in Clause 1(1) are hereby amended and/or supplemented as follows:

- SCC 1.1.1 In the contract defined as:
 - "THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE" the following words and expressions shall have the meanings herby assigned to them except where the context otherwise requires:
- SCC1.1.1.15 "Employer" means the Minister of Water and Sanitation acting on behalf of the Government of the Republic of South African and shall include the Employer's duly authorised representative.
- SCC1.1.1.16 "Employers Agent" means Contract Manager DWS: Construction South or any other person appointed from time to time by him and notified in writing to the Contractor. The Employers Agent will appoint an "Employers Representative" to act as Engineer for the purpose of the contract.
- SCC 6.5 Day works: Delete in entirety
- SCC 8.6.1 Change paragraph to read "Except if provided otherwise in the Contract Data, the Contract, without limiting his obligations in terms of the Contract, shall as part of the documentation required before commencing with the works in accordance with Clause 5.3.1, at his own cost, effect and maintain the following insurances in the name of the Contractor."
- SCC 8.6.1.1 Delete
- SCC 8.6.1.1.1 Delete with sub-clauses
- SCC 8.6.1.3 Change paragraph to read "Liability insurance that covers the Contractor against its respective liability for the death of, or injury to any person, or loss of, or damage to property arising from or in the course of the fulfilment of the Contract, from the Commencement Date to the issue of the Certificate of Completion for a limit of indemnity covering the risks of the Contractor for an amount not less than stated in the Contract Data."
- SCC 8.6.6 Delete SCC 8.6.7 Delete



GOVERNMENT PROCUREMENT GENERAL CONDITIONS OF CONTRACT

July 2010

GOVERNMENT PROCUREMENT GENERAL CONDITIONS OF CONTRACT July 2010

NOTES

The purpose of this document is to:

- (i) Draw special attention to certain general conditions applicable to government bids, contracts and orders; and
- (ii) To ensure that clients be familiar with regard to the rights and obligations of all parties involved in doing business with government.

In this document words in the singular also mean in the plural and vice versa and words in the masculine also mean in the feminine and neuter.

- The General Conditions of Contract will form part of all bid Documents and may not be amended.
- Special Conditions of Contract (SCC) relevant to a specific bid, should be compiled separately for every bid (if (applicable) and will supplement the General Conditions of Contract. Whenever there is a conflict, the provisions in the SCC shall prevail.

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General Conditions of Contract

1 Definitions

- 1 The following terms shall be interpreted as indicated:
- 1.1 "Closing time" means the date and hour specified in the bidding documents for the receipt of bids.
- 1.2 "Contract" means the written agreement entered into between the purchaser and the supplier, as recorded in the contract form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- 1.3 "Contract price" means the price payable to the supplier under the contract for the full and proper performance of his contractual obligations.
- 1.4 "Corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution.
- 1.5 "Countervailing duties" are imposed in cases where an enterprise abroad is subsidized by its government and encouraged to market its products internationally.
- 1.6 "Country of origin" means the place where the goods were mined, grown or produced or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 1.7 "Day" means calendar day.
- 1.8 "Delivery" means delivery in compliance of the conditions of the contract or order.
- 1.9 "Delivery ex stock" means immediate delivery directly from stock actually on hand.
- 1.10 "Delivery into consignees store or to his site" means delivered and unloaded in the specified store or depot or on the specified site in compliance with the conditions of the contract or order, the supplier bearing all risks and charges involved until the supplies are so delivered and a valid receipt is obtained.
- 1.11 "Dumping" occurs when a private enterprise abroad market its goods on own initiative in the RSA at lower prices than that of the country of origin and which have the potential to harm the local industries in the RSA.
- 1.12 "Force majeure" means an event beyond the control of the supplier and not involving the supplier's fault or negligence and not foreseeable. Such events may include, but is not restricted to, acts of the purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
- "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any bidder, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the bidder of the benefits of free and open competition.

- 1.14 "GCC" means the General Conditions of Contract.
- 1.15 "Goods" means all of the equipment, machinery, and/or other materials that the supplier is required to supply to the purchaser under the contract.
- 1.16 "Imported content" means that portion of the bidding price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or his subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs such as landing costs, dock dues, import duty, sales duty or other similar tax or duty at the South African place of entry as well as transportation and handling charges to the factory in the Republic where the supplies covered by the bid will be manufactured.
- 1.17 "Local content" means that portion of the bidding price which is not included in the imported content provided that local manufacture does take place.
- 1.18 "Manufacture" means the production of products in a factory using tabour, materials, components and machinery and includes other related value-adding activities.
- 1.19 "Order" means an official written order issued for the supply of goods or works or the rendering of a service.
- 1.20 "Project site," where applicable, means the place indicated in bidding documents.
- 1.21 "Purchaser" means the organization purchasing the goods.
- 1.22 "Republic" means the Republic of South Africa.
- 1.23 "SCC" means the Special Conditions of Contract.
- 1.24 "Services" means those functional services ancillary to the supply of the goods, such as transportation and any other incidental services, such as installation, commissioning, provision of technical assistance, training, catering, gardening, security, maintenance and other such obligations of the supplier covered under the contract.
- 1,25 "Written" or "in writing" means handwritten in ink or any form of electronic or mechanical writing.

2 Application

- 2.1 These general conditions are applicable to all bids, contracts and orders including bids for functional and professional services, sales, hiring, letting and the granting or acquiring of rights, but excluding immovable property, unless otherwise indicated in the bidding documents.
- 2.2 Where applicable, special conditions of contract are also laid down to cover specific supplies, services or works.
- 2.3 Where such special conditions of contract are in conflict with these general conditions, the special conditions shall apply.

3 General

- 3.1 Unless otherwise indicated in the bidding documents, the purchaser shall not be liable for any expense incurred in the preparation and submission of a bid. Where applicable a non-refundable fee for documents may be charged.
- 3.2 With certain exceptions, invitations to bid are only published in the Government Tender Bulletin. The Government Tender Bulletin may be obtained directly from the Government Printer, Private Bag X85, Pretoria 0001, or accessed electronically from www.treasury.gov.za

- 4 Standards
- 4.1 The goods supplied shall conform to the standards mentioned in the bidding documents and specifications.
- 5 Use of contract documents and information; inspection.
- 5.1 The supplier shall not, without the purchaser's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the purchaser in connection therewith, to any person other than a person employed by the supplier in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.
- 5.2 The supplier shall not, without the purchaser's prior written consent, make use of any document or information mentioned in GCC clause
- 5.1 except for purposes of performing the contract.
- 5.3 Any document, other than the contract itself mentioned in GCC clause
- 5.1 shall remain the property of the purchaser and shall be returned (all copies) to the purchaser on completion of the supplier's performance under the contract if so required by the purchaser.
- 5.4 The supplier shall permit the purchaser to inspect the supplier's records relating to the performance of the supplier and to have them audited by auditors appointed by the purchaser, if so required by the purchaser.
- 6 Patent rights
- 6.1 The supplier shall indemnify the purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the goods or any part thereof by the purchaser.
- 7 Performance security
- 7.1 Within thirty (30) days of receipt of the notification of contract award, the successful bidder shall furnish to the purchaser the performance security of the amount specified in SCC.
- 7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete his obligations under the contract.
- 7.3 The performance security shall be denominated in the currency of the contract, or in a freely convertible currency acceptable to the purchaser and shall be in one of the following forms:
 - (a) a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in the purchaser's country or abroad, acceptable to the purchaser, in the form provided in the bidding documents or another form acceptable to the purchaser; or
 - (b) a cashier's or certified cheque
- 7.4 The performance security will be discharged by the purchaser and returned to the supplier not later than thirty (30) days following the date of completion of the supplier's performance obligations under the contract, including any warranty obligations, unless otherwise specified in SCC.

8 Inspections, tests and analyses

- 8.1 All pre-bidding testing will be for the account of the bidder.
- 8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the Department or an organization acting on behalf of the Department.
- 8.3 If there are no inspection requirements indicated in the bidding documents and no mention is made in the contract, but during the contract period it is decided that inspections shall be carried out, the purchaser shall itself make the necessary arrangements, including payment arrangements with the testing authority concerned.
- 8.4 If the inspections, tests and analyses referred to in clauses 8.2 and 8.3 show the supplies to be in accordance with the contract requirements, the cost of the inspections, tests and analyses shall be defrayed by the purchaser.
- 8.5 Where the supplies or services referred to in clauses 8.2 and 8.3 do not comply with the contract requirements, irrespective of whether such supplies or services are accepted or not, the cost in connection with these inspections, tests or analyses shall be defrayed by the supplier.
- 8.6 Supplies and services which are referred to in clauses 8.2 and 8.3 and which do not comply with the contract requirements may be rejected.
- 8.7 Any contract supplies may on or after delivery be inspected, tested or analyzed and may be rejected if found not to comply with the requirements of the contract. Such rejected supplies shall be held at the cost and risk of the supplier who shall, when called upon, remove them immediately at his own cost and forthwith substitute them with supplies which do comply with the requirements of the contract. Failing such removal the rejected supplies shall be returned at the suppliers cost and risk. Should the supplier fail to provide the substitute supplies forthwith, the purchaser may, without giving the supplier further opportunity to substitute the rejected supplies, purchase such supplies as may be necessary at the expense of the supplier.
- 8.8 The provisions of clauses 8.4 to 8.7 shall not prejudice the right of the purchaser to cancel the contract on account of a breach of the conditions thereof, or to act in terms of Clause 23 of GCC.
- 9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing, case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.
- 9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the contract, including additional requirements, if any, specified in SCC, and in any subsequent instructions ordered by the purchaser.

9 Packing

- 10 Delivery and documents
- 10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified in the contract. The details of shipping and/ or other documents to be furnished by the supplier are specified in SCC.
- 10.2 Documents to be submitted by the supplier are specified in SCC.
- 11 Insurance
- 11.1 The goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the SCC.
- 12 Transportation
- 12.1 Should a price other than an all-inclusive delivered price be required, this shall be specified in the SCC.
- 13 Incidental services
- 13.1 The supplier may be required to provide any or all of the following services, including additional services, if any, specified in SCC:
 - (a) performance or supervision of on-site assembly and/or commissioning of the supplied goods;
 - (b) furnishing of tools required for assembly and/or maintenance of the supplied goods;
 - (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied goods;
 - (d) performance or supervision or maintenance and/or repair of the supplied goods, for a period of time agreed by the parties, provided that this service shall not relieve the supplier of any warranty obligations under this contract; and
 - (e) training of the purchaser's personnel, at the supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied goods.
- 13.2 Prices charged by the supplier for incidental services, if not included in the contract price for the goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the supplier for similar services.
- 14 Spare parts
- 14.1 As specified in SCC, the supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the supplier:
 - (a) such spare parts as the purchaser may elect to purchase from the supplier, provided that this election shall not relieve the supplier of any warranty obligations under the contract; and
 - (b) in the event of termination of production of the spare parts:
 - Advance notification to the purchaser of the pending termination, in sufficient time to permit the purchaser to procure needed requirements; and
 - (ii) following such termination, furnishing at no cost to the purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

15 Warranty

- 15.1 The supplier warrants that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the contract. The supplier further warrants that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by the purchaser's specifications) or from any act or omission of the supplier, that may develop under normal use of the supplied goods in the conditions prevailing in the country of final destination.
- 15.2 This warranty shall remain valid for twelve (12) months after the goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the contract, or for eighteen (18) months after the date of shipment from the port or place of loading in the source country, whichever period concludes earlier, unless specified otherwise in SCC.
- 15.3 The purchaser shall promptly notify the supplier in writing of any claims arising under this warranty.
- 15.4 Upon receipt of such notice, the supplier shall, within the period specified in SCC and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to the purchaser.
- 15.5 If the supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expense and without prejudice to any other rights which the purchaser may have against the supplier under the contract.

16 Payment

- 16.1 The method and conditions of payment to be made to the supplier under this contract shall be specified in SCC.
- 16.2 The supplier shall furnish the purchaser with an invoice accompanied by a copy of the delivery note and upon fulfillment of other obligations stipulated in the contract.
- 16.3 Payments shall be made promptly by the purchaser, but in no case later than thirty (30) days after submission of an invoice or claim by the supplier.
- 16.4 Payment will be made in Rand unless otherwise stipulated in SCC.

17 Prices

17.1 Prices charged by the supplier for goods delivered and services performed under the contract shall not vary from the prices quoted by the supplier in his bid, with the exception of any price adjustments authorized in SCC or in the purchaser's request for bid validity extension, as the case may be.

18 Contract amendments

18.1 No variation in or modification of the terms of the contract shall be made except by written amendment signed by the parties concerned.

19 Assignment

19.1 The supplier shall not assign, in whole or in part, its obligations to perform under the contract, except with the purchaser's prior written consent.

- 20 Subcontracts
- 20.1 The supplier shall notify the purchaser in writing of all subcontracts awarded under this contracts if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the supplier from any liability or obligation under the contract.
- 21 Delays in the supplier's performance
- 21.1 Delivery of the goods and performance of services shall be made by the supplier in accordance with the time schedule prescribed by the purchaser in the contract.
- 21.2 If at any time during performance of the contract, the supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the goods and performance of services, the supplier shall promptly notify the purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the supplier's notice, the purchaser shall evaluate the situation and may at his discretion extend the supplier's time for performance, with or without the imposition of penalties, in which case the extension shall be ratified by the parties by amendment of contract.
- 21.3 No provision in a contract shall be deemed to prohibit the obtaining of supplies or services from a national department, provincial department, or a local authority.
- 21.4 The right is reserved to procure outside of the contract small quantities or to have minor essential services executed if an emergency arises, the supplier's point of supply is not situated at or near the place where the supplies are required, or the supplier's services are not readily available.
- 21.5 Except as provided under GCC Clause 25, a delay by the supplier in the performance of its delivery obligations shall render the supplier liable to the imposition of penalties, pursuant to GCC Clause 22, unless an extension of time is agreed upon pursuant to GCC Clause
- 21.2 without the application of penalties.
- 21.6 Upon any delay beyond the delivery period in the case of a supplies contract, the purchaser shall, without canceling the contract, be entitled to purchase supplies of a similar quality and up to the same quantity in substitution of the goods not supplied in conformity with the contract and to return any goods delivered later at the supplier's expense and risk, or to cancel the contract and buy such goods as may be required to complete the contract and without prejudice to his other rights, be entitled to claim damages from the supplier.

- 22 Penalties
- 22.1 Subject to GCC Clause 25, if the supplier fails to deliver any or all of the goods or to perform the services within the period(s) specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, as a penalty, a sum calculated on the delivered price of the delayed goods or unperformed services using the current prime interest rate calculated for each day of the delay until actual delivery or performance. The purchaser may also consider termination of the contract pursuant to GCC Clause 23.

23 Termination for default

- 23.1 The purchaser, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate this contract in whole or in part:
 - (a) if the supplier fails to deliver any or all of the goods within the period(s) specified in the contract, or within any extension thereof granted by the purchaser pursuant to GCC Clause 21.2:
 - (b) if the Supplier fails to perform any other obligation(s) under the contract; or
 - (c) if the supplier, in the judgment of the purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the contract.
- 23.2 In the event the purchaser terminates the contract in whole or in part, the purchaser may procure, upon such terms and in such manner as it deems appropriate, goods, works or services similar to those undelivered, and the supplier shall be liable to the purchaser for any excess costs for such similar goods, works or services. However, the supplier shall continue performance of the contract to the extent not terminated.
- 23.3 Where the purchaser terminates the contract in whole or in part, the purchaser may decide to impose a restriction penalty on the supplier by prohibiting such supplier from doing business with the public sector for a period not exceeding 10 years.
- 23.4 If a purchaser intends imposing a restriction on a supplier or any person associated with the supplier, the supplier will be allowed a time period of not more than fourteen (14) days to provide reasons why the envisaged restriction should not be imposed. Should the supplier fail to respond within the stipulated fourteen (14) days the purchaser may regard the intended penalty as not objected against and may impose it on the supplier.
- 23.5 Any restriction imposed on any person by the Accounting Officer/ Authority will, at the discretion of the Accounting Officer/Authority, also be applicable to any other enterprise or any partner, manager, director or other person who wholly or partly exercises or exercised or may exercise control over the enterprise of the first-mentioned person, and with which enterprise or person the first-mentioned person, is or was in the opinion of the Accounting Officer/Authority actively associated.
- 23.6 These details will be loaded in the National Treasury's central database of suppliers or persons prohibited from doing business with the public sector.
- 23.7 If a court of law convicts a person of an offence as contemplated in sections 12 or 13 of the Prevention and Combating of Corrupt Activities Act, No. 12 of 2004, the court may also rule that such person's name be endorsed on the Register for Tender Defaulters. When a person's name has been endorsed on the Register, the person will be prohibited from doing business with the public sector for a period not less than five years and not more than 10 years. The National Treasury is empowered to determine the period of restriction and each case will be dealt with on its own merits. According to section 32 of the Act the Register must be open to the public. The Register can be perused on the National Treasury website.

- 24 Anti-dumping and countervailing duties and rights
- 24.1 When, after the date of bid, provisional payments are required, or anti- dumping or countervailing duties are imposed, or the amount of a provisional payment or anti-dumping or countervailing right is increased in respect of any dumped or subsidized import, the State is not liable for any amount so required or imposed, or for the amount of any such increase. When, after the said date, such a provisional payment is no longer required or any such antidumping or countervailing right is abolished, or where the amount of such provisional payment or any such right is reduced, any such favourable difference shall on demand be paid forthwith by the contractor to the State or the State may deduct such amounts from moneys (if any) which may otherwise be due to the contractor in regard to supplies or services which he delivered or rendered, or is to deliver or render in terms of the contract or any other contract or any other amount which may be due to him.

25 Force Majeure

- 25.1 Notwithstanding the provisions of GCC Clauses 22 and 23, the supplier shall not be liable for forfeiture of its performance security, damages, or termination for default if and to the extent that his delay in performance or other failure to perform his obligations under the contract is the result of an event of force majeure.
- 25.2 If a force majeure situation arises, the supplier shall promptly notify the purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

26 Termination for insolvency

26.1 The purchaser may at any time terminate the contract by giving written notice to the supplier if the supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27 Settlement of Disputes

- 27.1 If any dispute or difference of any kind whatsoever arises between the purchaser and the supplier in connection with or arising out of the contract, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation.
- 27.2 If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the purchaser or the supplier may give notice to the other party of his intention to commence with mediation. No mediation in respect of this matter may be commenced unless such notice is given to the other party.
- 27.3 Should it not be possible to settle a dispute by means of mediation, it may be settled in a South African court of law.
- 27.4 Mediation proceedings shall be conducted in accordance with the rules of procedure specified in the SCC.

- 27.5 Notwithstanding any reference to mediation and/or court proceedings herein,
 - (a) the parties shall continue to perform their respective obligations under the contract unless they otherwise agree; and
 - (b) the purchaser shall pay the supplier any monies due the supplier.

28 Limitation of liability

- 28.1 Except in cases of criminal negligence or willful misconduct, and in the case of infringement pursuant to Clause 6;
 - (a) the supplier shall not be liable to the purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the supplier to pay penalties and/or damages to the purchaser; and
 - (b) the aggregate liability of the supplier to the purchaser, whether under the contract, in tort or otherwise, shall not exceed the total contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

29 Governing language

29.1 The contract shall be written in English. All correspondence and other documents pertaining to the contract that is exchanged by the parties shall also be written in English.

30 Applicable law

30.1 The contract shall be interpreted in accordance with South African laws, unless otherwise specified in SCC.

31 Notices

- 31.1 Every written acceptance of a bid shall be posted to the supplier concerned by registered or certified mail and any other notice to him shall be posted by ordinary mail to the address furnished in his bid or to the address notified later by him in writing and such posting shall be deemed to be proper service of such notice
- 31.2 The time mentioned in the contract documents for performing any act after such aforesaid notice has been given, shall be reckoned from the date of posting of such notice.

32 Taxes and duties

- 32.1 A foreign supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the purchaser's country.
- 32.2 A local supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted goods to the purchaser.
- 32.3 No contract shall be concluded with any bidder whose tax matters are not in order. Prior to the award of a bid the Department must be in possession of a tax clearance certificate, submitted by the bidder. This certificate must be an original issued by the South African Revenue Services.

- 33 National Industrial Participation (NIP) Programme
- 33.1 The NIP Programme administered by the Department of Trade and Industry shall be applicable to all contracts that are subject to the NIP obligation.
- 34 Prohibition of Restrictive practices
- 34.1 In terms of section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, an agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if a bidder (s) is/are or a contractor(s) was/were involved in collusive bidding (or bid rigging).
- 34.2 If a bidder(s) or contractor(s), based on reasonable grounds or evidence obtained by the purchaser, has/have engaged in the restrictive practice referred to above, the purchaser may refer the matter to the Competition Commission for investigation and possible imposition of administrative penalties as contemplated in the Competition Act No. 89 of 1998.
- 34.3 Competition Commission of the restrictive practice referred to above, the purchaser may, in addition and without prejudice to any other remedy provided for, invalidate the bid(s) for such item(s) offered, and/or terminate the contract in whole or part, and/or restrict the bidder(s) or contractor(s) from conducting business with the public sector for a period not exceeding ten (10) years and/or claim damages from the bidder(s) or contractor(s) concerned.

Js General Conditions of Contract (revised July 2010)

C1.3 CONTRACT SPECIFIC DATA

The following contract specific data, referring to the General Conditions of Contract for Construction Works Third Edition (2015), are applicable to this Contract:

Compulsory Data

Clause	Description	Information		
	·	12 Months		
1.1.1.13	Defects and liability period	36 Months from commencement date		
1.1.1.14	The time for practical Completion	Minister of Water and Sanitation		
1.1.1.15	The name of Employer	Department of Water and Sanitation		
1.2.1.2	The address of the Employer	Private Bag X313		
		Pretoria		
		0001		
1.1.1.16	The name of the Employers Agent	Contract Manager DWS Construction		
1.1.1.10	The name of the Employers Agent.	South		
1.2.1.2	The address of the Employers Agent.	Department of Water and Sanitation		
		Construction South		
		4-6 Alkmaar Str.		
		Paarl		
		Tei: 021 8720604		
		Fax: 021 8720593		
1.1.1.26	The Pricing Strategy	Re-measurable		
3.2.3	Specific approval of the Employer required	5.7.3 Acceleration		
		5.12.3 Extension of Time		
		6.3.1 Variations		
		9.1 Termination of Contract		
		9.2 Termination by Employer		
		10 Claims and Disputes		
5.1.1.1	Special non-working days	Statuary holidays as declared by		
		National or Regional Government.		
		2. Three weeks annual Builders holiday		
		December to January (dates to be		
		confirmed)		
		The last Friday of every month.		
5.8.1	The non-working days	Sundays		
5.3.1	The documentation required before	Health and Safety plan (Clause 4.3)		
	commencement with works execution:	Initial programme (Clause 5.6)		
		Security (Clause 6.2)		
		Insurance (Clause 8.6)		
		Method Statements (as required by the		
		applicable Specifications)		
5.3.2	The time to submit the documentation	28 days		
	required before commencement with			
	Works execution			
5.4.2	The access and possession of the Site	Shall not be exclusive to the Contractor		
		but as set out in the Site Information		
5.13.1	The penalty for failing to complete the	R 1/14 % of the contact value of		
	Works	outstanding work per day		
5.14.1	Requirements for practical completion	On submission of all drilling and		
		grouting records of scheduled work		
5.16.3	The latent defect period	10 years		
6.2.1	The security to be provided by the	Performance guarantee of 10% of		
0.2.1	and the second of the second o			
0.2.1	contractor	Contract sum plus retention of 5% of the		

6.10.1.5	The percentage advance on materials not	0%
	yet built into the Permanent Works	
6.10.3	The limit of retention money	5% of the Contract Value
8.6.1.3	The limit of indemnity for liability insurance	R 5 000 000.00
10.5.3	The number of Adjudication Members to be appointed by the Contractor	1
10, 7.1	The determination of disputes	By arbitration

PART 2: DATA PROVIDED BY THE CONTRACTOR

Clause	Description	Information
1.1.1.9	The name of the Contractor	
1.2.1.2	The address of the contractor	Physical address:
		Postal address:
		E-mail address:
6.8.2	The value of the certificates issued shall	Fixed X = 0.15
	be adjusted in accordance with the	Labour A =
	Contract Price Adjustment Schedule with	Contractors Equipment B =
	the following values:	Material C =
		Fuel D =
6.8.2	The definition and source of :	The Consumer Price Index for the urban
	"L" is the "labour Index",	area nearest to the Site, as stated in the
		Contract Data, and as published in the
		Statistical News Release, P0141,
		Additional Tables : Table 14 "CPI- all
		items according to area" of Statistics
		South Africa and published by SAFCEC
		from time to time.
		Producer Price Index applicable to the
	"P" is the "Plant Index"	appropriate Construction equipment as
		stated in the Contract Data and as
		published in the Statistical Release
		P0151, Table 4 of Statistics South Africa
		and published by SAFCEC from time to time.
		Producer Price Index applicable to the
	"M" is the "Materials Index"	appropriate materials as stated in the
		Contract Data and as published in the
		Statistical Release P0151, Table 3 or
		Table 4 of Statistics South Africa and
	21	published by SAFCEC from time to time.
		Producer Price Index for Diesel at
	"F" is the Fuel Index	wholesale level for the coastal area as
		stated in the Contract Data and as
		published in the Statistical Release
		P0151, Table 4 of Statistics South Africa
		and published by SAFCEC from time to time.

6.8.3	Price adjustments for variations in the	Special Material(s)	Unit	Rate
	costs of special materials are allowed			
		******	******	***************************************

(End of Section C1)

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

C2. SCOPE OF WORK

CONTENT

C2.1	STANDARD SPECIFICATION
C2.2	PROJECT SPECIFICATION
C2.3	PARTICULAR SPECIFICATIONS
C2.4	VARIATIONS AND ADDITIONS TO SPECIFICATIONS

C2.1 STANDARD SPECIFICATION

SS 1 APPLICABLE STANDARD SPECIFICATIONS

In the event of any discrepancy between a part or parts of the Standardised or Particular Specifications and the Project Specifications, the Project Specifications and Particular Specifications shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Engineer before the execution of the work under the relevant item

The applicable standard specifications are mentioned in the Project Specification and Particular specification

C2.2 PROJECT SPECIFICATION

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PS 2.3	Rock Support
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PS 11.5 First Aid Provisions PS 11.6 Accident Reporting

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C2.2 PROJECT SPECIFICATION

PS 1 DESCRIPTION OF THE PROJECT

The raising of Clanwilliam dam, which will be the first phase of the Olifants-Doorn river

Water Resources Project (ODRWRP), will increase the yield of the dam by about 70 Mm3 per annum to augment the water supplies to the Olifants river irrigation scheme situated in the north-western part of the Western Cape province, as well as to assist in the development of resource-poor farmers.

Clanwilliam dam is located on the Olifants river, in the Western Cape, approximately 2 km south west of the town of Clanwilliam. The original dam was constructed in 1932-1935 (38m high from the base). The existing structure is a concrete gravity dam, consisting of a controlled ogee gravity spillway with 13 vertical crest gates. The length of the wall is 255 m. The total spillway length is 117,58 m, including the piers between the gates. The dam was raised in 1964 with vertical crest gates. Tensioned cables were supplied to ensure stability of the dam wall.

Currently water is released downstream via the Olifants river to Bulshoek weir from where the water is diverted into the dilapidated irrigation canal situated on the left bank. Water is also released from the existing outlet works situated on the right bank into an irrigation canal situated on the right bank, to the pump station on the right bank supplying water to the town of Clanwilliam, and to the hydropower plant situated downstream on the right bank.

The feasibility investigation for raising the dam was completed at the end of 2007 and the Record of Decision (ROD) was issued on 12 May 2009 by the Department of Environmental Affairs. Approval by the Minister for raising the dam by 13 m was issued on 18 August 2010.

In order to comply with current dam safety standards, the Department of Water and Sanitation is also required to implement remedial measures with the raising in the height of the dam wall.

The raised dam wall will be approximately 370 m in length and 49 m in maximum height. At full supply level the reservoir will cover a surface area of approximately 2 022 ha and capacity of 344,3 million cubic metre The works include addition of concrete on the downstream side, extending the apron, construction of a free standing intake tower, river outlet control house, a power generating house, short tunnel and coffer dam works on the upstream side, as well as various other pipe outlet structures on the downstream side. This work must be done without interfering with the day to day operation of the dam.

PS 2. SCOPE OF THE CONTRACT

PS 2.1 General

The detail of the work to be carried out under this contract includes, but is not limited to:

- a) The Contractors' site establishment, including establishment of compressed air installations, drilling equipment, all material required and any equipment required to do the work.
- b) Performing a trial blast in order to be able to compile a specification for maximum allowable vibration.
- c) Do blasting of hard material in the excavation at the different sections.
- d) Provide blasting records and legal compliance documentation in terms of Explosives Act and blasting records as required.
- e) Do mechanical demolition of apron concrete slab on top of rock before blasting excavation
- f) The excavated face must be made safe if required and will consist of the following methods either as stand alone or in any combination as proposed by Contractor and approved by Engineer on exposure of slopes:
 - Double twisted wire mesh protection of slopes and cliffs where there may be a danger of falling rocks;
 - Shotcrete applied to rock surface; and
 - Rock bolts, geo-nails and rock dowels as indicated on drawings.
- g) Documenting the slope protection measures in agreed format.

It is envisaged that the work be carried out in phases and it could be necessary to temporary de-mobilize and remobilize to site. The final extent of the contract will depend on the geological conditions. The quantities are considered to be a reasonable estimate of the expected work to be done under this contract.

All work shall be done in accordance with the specifications listed in the Project Specification, the Particular Specifications and Drawings.

The work is divided into sections and the quantities of the work items in the Bill of Quantities have been listed under the following sections:

- Excavation for the Approach channel and Inlet works upstream of dam wall
- Excavation for Left Non Overspill section above existing level to new level
- Excavation for the Outlet works downstream of the dam wall
- Excavation for Spillway section below existing Apron downstream of the dam wall
- Excavation for Right Non Overspill section downstream of the dam wall and above the existing level to the new level

It is envisaged that the excavation work will be carried out in phases. As a section of rock is blasted, the excavation work will commence and rock material will be removed to spoil. During this operation the Contractor is expected to commence with the drilling of anchors and/or dowels and shotcrete where required and/or placing of the rock drapery. There is no time allowed for in the excavation process to do this as a separate process

P\$2.2 Drill & Blast

Since a major part of the works undertaken in the raising of Clanwilliam dam is to improve the safety of the existing dam wall, especially its sliding resistance, all excavations performed shall be done in such a manner, that it does not destabilize the dam wall. Blast designs must be done to keep the Maximum Peak Particle Velocity and Frequency to the minimum within the allowed specified tolerance.

All blasting shall be done in sections and phases according to specifications and agreed with the Engineer.

Blasting shall be done by making use of Perimeter, Trim and Bulk blasting methods to accommodate the hard excavation in the different areas.

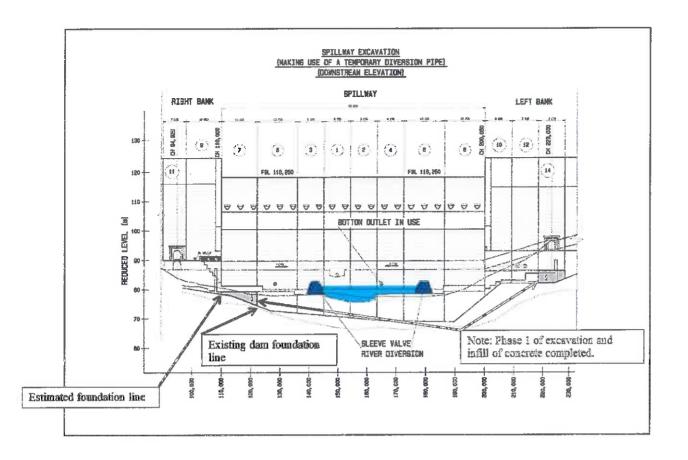
Excavation of the Approach Channel and Inlet section on the left bank is envisaged to be done in the following phases:

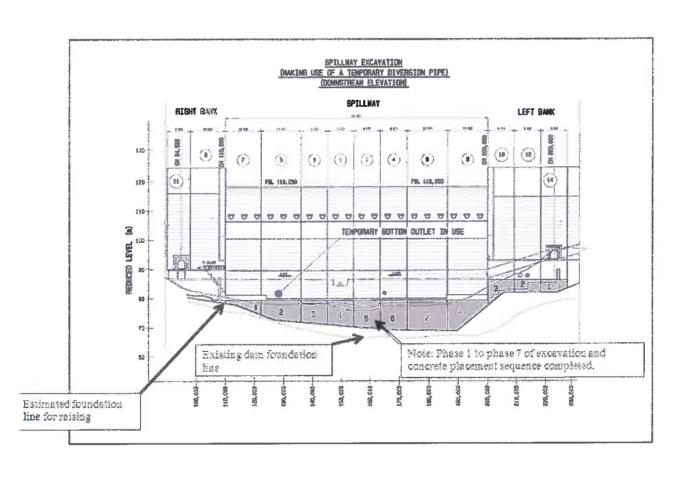
- Phase 1: From highest point ± RL 115 down to RL 108 (7m)
- Phase 2: From RL108 to RL 103.6 (4.4 m)
- Phase 3: From RL 103.6 to RL 100 (3.6m)
- Phase 4: From RL100 to 94 (6m)
- Phase 5: From RL 94 to RL 88 (6m)
- Phase 6: From RL 88 to RL 80 (8m)

Excavation of the spillway shall be done in a phased block by block manner, in which a slot is excavated and backfilled with concrete before the immediate next block is excavated, from outside to the inside, in a typical fashion as shown in the accompanying figures. Appropriate rock slope stability measures to be applied to ensure safety of the workers.

It is a requirement that the Contractor will submit a preliminary Method Statement for each section of work in which the following is clearly stated:

- Proposed phases of blasting
- The intended blasting methods
- The type of explosives to be used for different blasting methods
- The intended drill pattern to be used for different blasting methods
- The intended method of Measurement





PS 2.3 Rock support

Rock support is required to stabilize the deep excavation walls and to provide a safe work area. The rock support will be implemented as soon as the blasting is completed and the rock face become clear, during excavation, for inspection. The Engineer will confirm if the requirements on the Drawings are sufficient and or any other additional measures are required. The rock support consisting of any combination of rock bolts, wire mesh and shotcrete, will be completely installed before the next phase of excavation continue.

Rock bolts, shotcrete and double twisted wire mesh will be installed as indicated on the drawings and directed by the Engineer according to Particular Specification CWD09 Rock Support.

It is a requirement that the Contractor will submit a preliminary Method Statement for the: Installation of rock bolts shotcrete application Fixing of double twisted wire mesh to the rock face

PS 3. THE SITE

PS 3.1 Location and access to site

The dam site is situated on the Olifants river, in the Western Cape, approximately 2 km South- West of Clanwilliam town in the Western Cape province.

The site is immediately next to the N7 and accessed through a controlled gate. The gravel site roads will be regularly maintained but could get challenging under abnormal rainfall conditions.

PS 3.2 Weather

The Clanwilliam dam site is situated in the Western Cape province in the winter rainfall region with hot summers and cold wet winters. Average summer maximum and minimum temperatures are in the order of 39°C and 11°C respectively. Corresponding winter temperatures are 31°C and 4°C.

Relevant detailed meteorological information were obtained for the site from Weather Station No 00846710 at Clanwilliam dam, situated at RL 103 m. Average monthly minimum and maximum temperatures obtained from that station are listed in Table 1. These records will be used for tender purposes and will be compared to information from a weather station to be installed at the dam site before construction commence. The prevailing wind direction(s) is South East and North West.

Table 1: Average Minimum and Maximum Temperatures (°C) Measured at Clanwilliam

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	41	40,5	39	37	32	27	26	29	33	35	40	41
Min	13,5	13	11	8	5	3	2	2,5	5	7	10	12

The Clanwilliam dam catchment has a mean annual precipitation (MAP) of 575 mm. The area has a winter rainfall pattern.

PS 3.3 General Geological Conditions

The Clanwilliam dam is underlain by the Skurweberg Formation, Nardouw Subgroup of the Table Mountain Group, which comprise of thickly bedded, medium to coarse grained sandstone. The dam is located in a major synclinal structure within the western arm of the Cape Fold Belt, which, apart from the history of deformation and folding, is also associated with large scale faulting.

The foundation geology comprises quarzitic sandstone which is characterised by minor interbedded siltstone horizons. The overall structure of the founding rock mass is governed by the bedding which, on the left flank and within the river section, dips at angles between 10° and 20° in a downstream direction, but on the right flank dips slightly out of the slope (also at shallow angles).

On the upper left flank the rock mass is generally slightly weathered but highly weathered horizons are also present; the mid flanks are mainly slightly weathered, and the strata within the river section generally slightly to moderately weathered, hard rock to very hard rock. The right flank similarly mainly comprises slightly too moderately weathered strata. Numerous highly weathered, medium hard to soft rock and sandstone horizons also occur. The interbedded siltstone horizons typically comprise medium hard rock to soft or very soft rock, and are even weathered to clay in places.

Packer (Lugeon) tests revealed the founding rock mass on the left flank to generally be impervious. Highly pervious zones were recognised within the river section but the rock mass was otherwise impervious.

The right flank is characterised by a number of pervious zones as well as numerous total water losses. The Lugeon pattern further indicates wash-out, presumably relating to the weathered siltstone inter beds. Foundation grouting is necessary; curtain grouting will control foundation seepage as well as erosion of the siltstone inter beds while consolidation grouting of the footprint will contribute to improving the integrity of the founding rock mass, and enhancing the stiffness.

For detail information see "The Second Engineering Geological Report for design of Clanwilliam dam raising" is attached under Section C5: SITE INFORMATION

PS 4. FACILITIES PROVIDED BY MAIN CONTRACTOR to CONTRACTOR

PS 4.1 Contractors Yard

A Storage area of 50m by 25m, to the west of the N7 will be provided as part of the main site establishment area. If the Contractor requires more area or any other area it must be specified in his document and be negotiated with the Main Contractor.

The Main Contractor will supply only potable water to the sub-contractors yard for human consumption. The Contractor must make arrangements for its own water distribution required in the performance of its duties

PS 5. FACILITIES PROVIDED BY CONTRACTOR FOR WORKS

PS 5.1 Electrical Power and Distribution

The Contractor shall make his own arrangements to provide his own power supply.

Failure or interruption of the power supply shall not relieve the Contractor of any of his obligations under the Contract

PS 5.2 Water Supplies

The Contractor shall be responsible for making his own arrangements for the supply of water that he may require for drilling and grouting construction purposes. Water quality shall be as per clause CWD23.3.2. Subject to quality, water can be abstracted from the Olifants river. A record of abstraction must be kept on a daily basis and must be submitted on a monthly basis with contractor's returns.

Failure or interruption of any source of water shall not relieve the Contractor of any of his obligations under the Contract.

PS 5.3 Communications

The Contractor shall make his own arrangement with regards to his required communication requirements

PS 5.4 Accommodation and Site Facilities

The Contractor must supply his own offices, storage facilities and workshop. The Main Contractor will indicate available areas for site establishment. A layout of proposed site facilities must be submitted with tender.

The Contractor shall make his own arrangements for accommodation for his staff. No accommodation is allowed on the site in terms of the Environmental EMP.

PS 5.5 Laboratory

The Contractor must provide for his own site testing facilities.

P\$ 5.6 Resting and eating areas

The contractor shall provide sufficient and suitably positioned areas for use by his workers on site during resting and eating periods. Sufficient refuge bins, tables and seating must be provided. Existing and new permanent structures for the raised dam wall may not be used as resting and eating areas.

PS 5.7 Sanitation and cleaning

The Contractor shall provide at or within 200m of each work place chemical toilet facilities with toilet paper, potable water, soap and towels together with industrial soaps and barrier creams as appropriate. He shall maintain them in a clean and sanitary condition and shall take all necessary precautions to prevent pollution of the Site. The sewage will be disposed of at a registered disposal facility and the disposal certificate will be kept on record.

The Contractor shall ensure that there are adequate and sufficient refuse bins in and around the working area and that these shall be emptied frequently. All refuse bins shall be placed on a concrete base, which shall, from time to time, be sprayed with insecticide. All refuse collection, removal and disposal on site shall be the responsibility of the Contractor. All refuse shall be disposed of at a licensed landfill site only, and certificates of receipt shall be kept on record.

The Contractor shall clear away and remove all traces of the toilets and restore the sites to their original condition as soon as the toilets are no longer required

PS 5.8 Access control and security

The Main Contractor will be responsible for access control and security for the site. The Contractor will abide by the access control measures. The Contractor is responsible for the safe guarding and protection of his own contractor's yard and his equipment and plant on site. The Main Contractor does not take any liability for the Contractor in terms of security what so ever.

PS 6. WORKING TIMES

P\$ 6.1 Work at Night

The Contractor could be requested to perform work at night. Responsible and qualified supervisory staff shall always be present and sufficient light must be available to conduct the work safely. No drilling and grouting will be permitted at night.

PS 6.2 Sunday Working

Sunday work shall not be permitted except for necessary maintenance, repairs and emergencies and shall only be undertaken with the prior written approval of the Engineer.

PS 6.3 Last Friday of Month

The last Friday of the month is regarded as the pay day of the Main Contractor and Engineer's personnel. This is a non-working weekend for Main Contractor and Engineer's personnel, and the Contractor will only be allowed to work with special permission on this day

PS 7. CLIMATIC CONDITIONS

PS 7.1 Rainfall data

The rainfall data to be used for extension of time arising from abnormal rainfall is presented in the table: rainfall record.

Table: Rainfall Record

Rainfall Station No:00846710 Clanwilliam Period: 1992-2012

Month	AVE	STD DEV	N DAY	NUM MON	MAX R	MAX RAIN
			RAIN		DAY	DATE
January	0,0	0.26	0,05	19	13,8	5/1/2004
February	0,25	0.53	0.11	20	10,8	23/2/2010
March	0,45	0.89	0.14	20	29	26/3/1997
April	0,85	1.38	0.33	20	21.4	26/4/2007
May	2,05	3.05	0.76	19	25	8/5/1998
June	3,03	3.98	1.35	18	54.5	8/6/1997
July	2,67	3.23	1.05	18	29.4	26/7/2007
August	2,03	2.80	0.58	18	27.8	18/8/2003
September	0,95	1.35	0.37	18	11.5	12/9/1996
October	0,52	0.91	0.22	18	12.6	19/10/2011
November	0,67	1.16	0.21	18	29.4	8/11/2009
December	0,52	1.11	0.21	18	19.6	24/12/2007

Explanation of headings:

'AVE' represents the average rainfall for the month = Rn

STD DEV' represents the standard deviation from the normal

'N DAY RAIN' represents the average number of rain days per month exceeding 10 mm = Nn

'NUM MON' represents the number of months used in the calculation

'MAX R DAY' represents the maximum rainfall that occurred over a 24-hour period (08:00-08:00)

'MAX RAIN DATE' represents the date on which the maximum 24 hour rainfall occurred

PS 7.2 Extension of time arising from abnormal rainfall

Extension of time in terms of the Conditions of Contract arising from abnormal rainfall shall be calculated separately for each calendar month or part thereof in accordance with the formula given below. It shall be calculated for the whole period until completion of the contract including any extension thereof:

V = (Nw - Nn) + 0,050 (Rw - Rn)

If V is negative and it absolute value exceeds Nn then V shall be taken as equal to minus Nn.

The symbols shall have the following meanings:

V = Extension of time in calendar days in respect of calendar month under consideration.

Nw = Actual number of days during the calendar month on which a rainfall of 10 mm or more has been recorded.

Rw = Actual rainfall in mm for the calendar month under consideration.

Nn = Average number of days, as derived from existing rainfall records provided in

Table 1.12.1, on which a rainfall of 10 mm or more has been recorded for the calendar month.

Rn = Average rainfall in mm for the calendar month, as derived from the rainfall records supplied in Table 1.12.1

The total extension of time shall be the algebraic sum of the monthly totals for the period under consideration. Extensions of time for part of a month shall be calculated using pro rata values of Nn and Rn.

The factor (Nw - Nn) shall be considered to represent a fair allowance for variations from the average number of days during which rainfall exceeds 10 mm.

The factor 0,050 (Rw - Rn) shall be considered to represent a fair allowance for variations from the average in the number of days during which the rainfall does not exceed 10 mm but wet conditions prevented or disrupted work.

Accurate rain gauging shall be taken at the weather station to be supplied by the Main Contractor at a suitable point on Site as indicated by the Engineer.

PS 8. PROGRAMMING REQUIREMENTS

PS 8.1 Tendered Contract Programme

The tentative programmed dates are as follows:

Nr	Work Place	Start Date	End Date	Working days
1.	Excavation of Approach channel and Inlet works upstream of dam wall	January 2019	March 2019	
2.	Excavation of Left Non Overspill section above existing level to new level	October 2019	April 2020	
3.	Excavation for the Outlet works downstream of the dam wall	July 2019	December 2019	
4.	Excavation for Spillway section below existing Apron downstream of the dam wall	November 2018 October 2019	May 2019 December 2019	
5.	Excavation for Right Non Overspill section downstream of the dam wall and above the existing level to the new levels	March 2019	June 2019	
6.	Drill and Blast trials in the Quarry	October 2018	November 2018	30

An overall preliminary programme in the form of a Gant chart must be submitted with the tender. The following must be shown:

- a) The proposed sequence of the various activities.
- b) The dependencies that exist between the activities and whether these are time related or resource limited.
- c) Any shutdown periods proposed by the contractor.
- d) Any slack time built into various activities or sub-phases.
- e) The critical path of the work to be undertaken.

This programme shall be in sufficient detail so that it can form the basis of a more detailed construction programme to be prepared after the Contract has been awarded.

PS 8.2 Contract Programme Maintenance and Progress Monitoring

A detail Contract Programme shall be developed using the latest version of Construction Computer Software for Windows or Microsoft Project for Windows or equal.

Five working days before the monthly progress meeting the Contractor shall submit to the Engineer a programme update that reflects the actual progress against current programmes and the effect on future activities.

The Contractor shall also submit a narrative report with each monthly update including a description of current and anticipated programme related problem areas, current and anticipated delaying factors and their impact, and an explanation of corrective actions taken or proposed.

All variances from the Contract Programme shall be promptly reported and the future impact of such variations shall be determined and analysed by the Sub-Contractor and necessary corrective measures established, subject to the approval of the Employer.

PS 8.3 Progress Meetings

The Contractor will be required to attend regular site meetings with the Engineer where the progress of construction will be reviewed. Such meetings will normally be held monthly. The Contractor shall also attend weekly meetings with the Engineer and provide, prior to each meeting as required by the Engineer, detailed programmes showing separately the various activities of the Contractor anticipated over the forthcoming two week period.

PS 9. CONSTRUCTION MATTERS

PS 9.1 General Responsibilities

The Site and all services are under the control of the Main Dam Contractor and therefore the Employer expects the Contractor to liaise regularly with the Main Dam Contractor in order to ensure smooth execution and integration of activities with the Main Dam Contractor's activities.

Non-performance of the Main Dam Contractor shall not relieve the Contractor of any of his obligations under the Contract.

Due to the specialised nature of the Works the Main Dam Contractor shall ensure that qualified technical staff is available on site to carry out the necessary calculations for setting out of the grout hole positions as well as undertake the setting out. The contractor must liaise in time with the Main Dam Contractor on his requirements.

PS 9.2 Contractors Methods and Materials

It is a requirement of this contract that final work procedures must be approved before commencement of work. Method statements will full details concerning the methods, equipment and materials will be required for the following but not limited to:

- Blasting.
- Rock Support.

PS 9.3 Quality Management

The Contractor shall be responsible under the Contract for the quality and testing of materials, workmanship and production processes in fulfilment of the Contract. The Contractor shall have a Quality Management system in place which details the following in order to satisfy the Specification relevant to each operation to the works in accordance with the Contract

- Quality control procedures
- Personnel responsibilities
- Testing procedures, both on and off-site
- Equipment and calibration;
- Frequency of testing, calibration, etc.
- Hold points in production for inspection
- Rejection and rectification procedures
- Documentation and communication
- Drawing issue procedures and
- Drawing register.

As much of the testing as is practicable shall be carried out on Site, including trial, acceptance and routine testing which is the responsibility of the Contractor, and any other tests as instructed by the Engineer for any additional investigations required from time to time during the course of the Contract.

PS 9.4 Provision of Materials and Goods

The Contractor must propose a grout mix design a month before grouting commences to the APP with the following in mind:

- a) The grout mix should have a low viscosity, possibly not more than 40 seconds (Marsh Cone) and low shear strength in order to achieve an optimal penetration of the grout.
- b) The cement grains should be small in order to penetrate into fine fissures.
- c) The grout should be relatively stable with a bleed percentage of not more than 3 5% measured in the standard cylinder.

The grout should have a reasonably high strength of more than 20 MPa @ 28 days. This would require a relatively low water-cement ration i.e. w:c 1:1 to 1:1.5. All materials used and the standards of workmanship employed for the execution of the works shall comply with the appropriate SABS/SANS Standard and/or Code.

The Contractor shall supply his/her own cement conforming to SANS 50197.

Sand can be sourced at cost from the Main Dam Contractor. The Contractor however must determine and prove the suitability of the sand according to SANS 1083.

If the Contractor intends to use any additives, he must submit full technical information and the applicable standard for approval before commencement of work.

PS 9.5 Competence of Workmen

The -Contractor shall ensure that only competent personnel are employed in operations involving particular skills affecting the quality of the works. Should the competence of any member of the Contractor's workforce be in doubt, the Engineer may order that the member be sent for additional training at the Contractor's account and/or that member be replaced with a competent person to perform that work.

PS 9.6 Contractor's Returns

Records and returns shall be reported to the Engineer in an agreed format:

a) Weekly

The Contractor shall keep accurate daily records detailing work carried out on the works and shall submit them to the Engineer prior to the weekly progress meeting or at such other times as the Engineer may require. The records shall include the following for each Portion of the Works separately and in sufficiently detail to establish the person-hours and equipment hours expended:

- Extent of work done;
- The numbers of each category of workmen and supervising staff;
- The numbers and types of Contractor's Equipment used;
- The time and duration of any significant delays or breakdowns of any Contractor's Equipment; and
- Any other events relevant to progress of the works.

The Contractor shall also provide such further information as may be requested by the Engineer.

b) Day work and Similar Records

Records shall be kept daily of labour, materials and equipment where there is an agreement to pay by day works. Such records shall be valid only when signed by both parties.

In cases where there is any dispute or uncertainty on payment procedure, sheets shall be signed daily by both parties as an agreed record of work done but shall not imply any commitment concerning payment. These sheets shall be annotated "For record purposes only".

PS 10. RECRUITMENT

The Labour Desk will be established by the Employer.

The Labour Desk will be responsible for the recruitment of local labour. The Contractor shall advise the labour desk in writing of the numbers of each category of temporary workers, which is required, and the period for which they are required.

The Contractor shall pay his employees and shall ensure that his Sub-contractors pay their employees rates of remuneration not less than prescribed by legislation and applicable to the area of the Works and shall observe conditions of employment which are no less favourable than those which are customary in the area in which the works are to be constructed for those trades and occupations involved in the fulfilment by the Sub-Contractor of his obligations under the Contract. The Sub-Contractor shall also practice and ensure that his Sub-contractors practice a policy of equal remuneration, conditions of employment and benefits for people of equal skills and productivity.

PS 11. HEALTH AND SAFETY

PS 11.1 General

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor, as employer in his own right in respect of the contract, will be responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2003.

Furthermore, the Contractor shall comply with any additional current statutory requirements of any relevant Government Departments regarding health and safety and specifically environmental health issues.

Nothing specified in this document shall relieve the Contractor of any obligations or responsibilities with regard to health and safety responsibilities.

Where safety precautions are not being observed, the Employer may order the Contractor to comply with minimum safety requirements at the Contractor's expense, and compliance with such an order will not absolve the Contractor from any of his responsibilities and obligations under the Contract.

Before commencement of work under the contract the Contractor shall:

- 1. Enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.
- Submit a Health and Safety Plan to the Employer within 28 days after the Commencement Date. The Contractor shall immediately implement the policy and any amendments, and keep it in operation for the full duration of the Contract.
- 3. Submit a risk assessment of the contract works as part of the Health and Safety Plan and which is to include;
 - (i) Identification of the risks and hazards;
 - (ii) Analysis and evaluation of the risks and hazards identified;
 - (iii) A documented plan of safe work procedures;
 - (iv) A monitoring plan; and
 - (v) A review plan.

The Contractor is required to keep health and safety records (which shall include audit reports) on site in an orderly filing system which shall be handed over to the Employer on completion of construction.

Failure by the Contractor to comply with safety requirements will entitle the Employer to reduce payment of the relevant Bill of Quantity items and/or order a temporary halt of work within the affected areas until the specified requirements are met, without any extension of time being granted and without any additional payment

Refer to CWD01 HS Health and Safety Specification in the Particular Specification Document.

A Pro-Forma Health and Safety plan must be submitted with the Tender.

P\$ 11.2 Audits

The Contractor shall arrange for health and safety audits at monthly intervals to be carried out. The results and details of these audits shall be submitted to the Employer within the first week of the next month.

The Employer will monitor compliance by the Contractor with the Health and Safety Policy by means of Audits, and may give instructions for improvements.

The Contractor shall note that independent health and safety audits (or if considered suitable by the Employer combined audits with the Contractor's auditor) will be carried out as considered necessary by the Employer.

PS 11.3 Works Health and Safety Committee

For the purpose of implementing and monitoring the Health and Safety Plan the Contractor shall put in place a Health and Safety Committee.

The Committee shall meet at least at monthly intervals. Minutes of the meeting shall be kept by the Contractor and copied to Employer within 7 days of the meeting.

PS 11.4 Health and Safety Officers

The Contractor shall appoint a full time permanent Health and Safety Officer on the commencement of the works. On the commencement of shift working he shall appoint at least one deputy with the same duties. The Health and Safety Officer and his deputy (or deputies) shall be employed exclusively on health and safety matters, and at least one of them shall always be available on Site so that Health and Safety matters receive 24 hour coverage for the full duration of the Contract. The Health and Safety Officer, or his deputy shall carry out regular and random checks of all parts of the Site where work is taking place.

PS 11.5 First Aid Provisions

The Contractor shall provide a first aid station. The Contractor shall institute and operate a basic first aid training programme to ensure that at least each foreman or work crew leader is trained in first aid and possesses a valid certificate to that effect issued by the Red Cross Society of South Africa, or equivalent qualification within 3 months of his appointment. There shall be a person certified in first aid in each work crew.

PS 11.6 Accident Reporting

The Contractor, through the Health and Safety Officer or his deputy, shall keep the Main Contractor informed at the time, or as soon thereafter as is practical but not later than 12 hours, of any occurrence during the course of work, whether on or off the Site, if the said occurrence affected or may have affected the health or safety of any person employed on the Site or of any member of the public. The Contractor shall submit to the Employer at the end of each month reports and statistics in spreadsheet format approved by the Employer on all accidents involving any person employed on or visiting the works.

PS 11.7 Workman's Compensation Act

By accepting the Contract, the Contractor warrants that all his and his Sub-Contractor's workmen are covered in terms of the Compensation for Occupational Injuries and Diseases Act (Act no 130 of 1993) which covers shall remain in force whilst any workman is present on the Site.

PS 12. ENVIRONMENTAL REQUIREMENTS

The Contractor shall take full responsibility for protecting the natural environment and eliminating or minimising the negative impacts of construction on the environment during construction.

PS 12.1 General

The main project, Raising of Clanwilliam dam, has been environmentally authorised under a Record of Decision (ROD). The ROD requires that all activities conducted by the Main Dam Contractor and Contractors/Sub-contractors are within the framework of the Environmental Management Plan (EMP) and Rehabilitation Specifications (RS) of the Site. This document is available from the Employer.

The Contractor and his staff must be familiar with the EMP & RS and execute the project in such a way that it complies with the requirements of the EMP and RS. The Employers Agent will regularly inspect the Contractor's site. In the event that the Contractor does not comply with the requirements the deviation must be rectified as recommended by the Employers Agent at the Contractor's cost.

The Contractor shall construct and/or implement all the necessary environmental protection measures in each area before any production work will be allowed to proceed. The Employer may suspend the works at any time should the Contractor, fail to implement, operate or maintain any of the environmental protection measures adequately. The costs of such suspension shall be to the Contractor's account.

The Contractor shall submit a Method Statement containing details of all site layouts and environmental protection measures proposed to the Employer for review and approval.

These shall include:

- Pollution prevention measures;
- Settlement pond design and location; and
- Design of access roads outside the works area.

PS 12.2 Temporary Services and Facilities

All fuel storage tanks shall be bunded to 110 % of the total storage capacity. Fuel dispensing areas and workshop areas shall be provided with concrete slabs draining to oil separators. This will also apply to other areas with pollution potential.

Vehicle cleaning shall be undertaken in designated wash bays, which have an impermeable floor and are bunded to contain runoff and direct in onto a sump. Oil and diesel will be skimmed off the sump water and recycled or disposed of in the correct manner. The design and layout of this sump shall be submitted to the Employer for approval before construction commences.

Vehicles worked on outside the wash bays will have portable drip trays placed under them to catch oil and diesel which may leak from the vehicles.

PS 12.3 Protection of Rivers, Streams and Watercourses

All rivers, streams and watercourses shall be protected from direct or indirect spills of pollutants such as garbage, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and waste water or organic material resulting from the Contractor's activities. In the event of a spill prompt action shall be taken to clear polluted or affected areas.

The Contractor shall not work within streams, watercourses and wetlands without the written approval or as required for the execution of the work.

PS 12.4 Refuse and Waste Control

The management of solid waste on site shall be strictly controlled and monitored. The Contractor shall adhere to and implement the following:

- Labelled recycling bins shall be used and waste separated where possible. In addition, a recycled-material collection schedule shall be established and the bins shall be collected regularly;
- Eating areas for the construction staff shall be designated and supplied with waste bins to control litter;
- No on-site burying or dumping or unauthorised burning of any waste materials, vegetation, litter or refuse shall occur;

Solid waste shall be disposed of off site, at an approved landfill site. The Contractor shall supply the Employer with a certificate of disposal; and waste shall be separated into domestic waste, building/construction rubble, scrap metal, oil and grease and hazardous waste and dealt with in the following manner:

- a) Domestic waste
 - Sultable refuse bins, all with lids, shall be provided by the Contractor for his own buildings. Refuse shall be collected and removed from all facilities on the Site at least twice per week. Domestic waste shall be transported to the approved refuse disposal site off site in covered containers or covered trucks.
- b) Organic waste
 - Refuse from food preparation and eating areas shall be collected and removed daily. Organic waste shall be disposed of as per Domestic waste.
- c) Building/Construction waste
 - Inert building/construction rubble shall be disposed of by burying in the dam basin in borrow pits, at a site and in such a way as approved by the Employer.
- d) Scrap metal
 - Scrap metal shall be disposed of offsite.
- e) Used oil and grease
 - Used oil and/or grease shall be removed from site and sold to an approved used oil recycling company.
- f) Hazardous waste
 - All hazardous waste shall be disposed of in an approved hazardous waste disposal site and a disposal certificate supplied to the Employer.

PS 12.5 Protection of Flora

The removal, damage and disturbance of indigenous flora is prohibited. The Contractor shall request permission before removal of any vegetation on the designated work area and undertake to demarcate and protect flora outside the designated work area.

PS 12.6 Protection of the Fauna

The Contractor shall protect fauna living within the Site and shall ensure that hunting, snaring, poisoning, shooting, nest raiding or egg-collecting and disturbance does not occur. The Contractor is to ensure that his employees are instructed not to feed wild animals and no domestic pets or livestock are permitted on site.

The use of pesticides is prohibited unless approved by the Employer.

PS 12.7 Preservation of Topsoil

The Contractor shall get approval from the Employer before the removal of any topsoil. The top soils will be stored in designated areas.

PS 12.8 Erosion Control and Storm water Management

The Contractor shall include in his/hers works layout of the site works measures to prevent erosion resulting from his actions on the site. The Contractor shall take appropriate and active measures to prevent erosion resulting from his works, operations and activities which shall be agreed with the Employer even when such potential erosion may take place or occur beyond the limits of the Site because of the actions of the Contractor.

C2.3 PARTICULAR SPECIFICATIONS

CWD 01SC

General

CWD 01HS

Health and Safety

CWD 08

Rock Support

CWD 09

Blasting

PARTICULAR SPECIFICATION CWD01 SC GENERAL

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PARTICULAR SPECIFICATION CWD01 SC

GENERAL

CWD01SC 1 SCOPE

This specification covers general requirements applicable to all the activities required to complete the Works and includes the requirements for the Contractor's Establishment on Site.

CWD01SC 2 INTERPRETATIONS

CWD01SC 2.1 Application

Each standard referred to in a Standardised or Particular Specification shall be deemed to be the latest edition, including all amendments issued by the relevant body, published three calendar months or more before the closing date for receipt of tenders.

CWD01SC 2.2 No Limitation by Description

Nothing appearing in the Specification, Drawings or Schedule shall limit the obligations and liabilities of the Contractor, the Engineer or the Employer under the Conditions of Contract.

CWD01SC 2.3 Approval

No approval of any material or plant and its operation, or of any construction procedure to be used, will imply any relaxation of the requirements governing the quality of the materials or of the finished work, or relieve the Contractor of his responsibilities under the Contract.

CWD01SC 3 MATERIALS

The Contractor, when using materials that are specified to comply with a standard specification shall, if so ordered, furnish the Engineer with certificates showing that the materials do so comply. Where so specified, materials shall bear the official mark of the appropriate standards authority.

Samples ordered or specified shall be delivered to the Engineer's office on the Site. Unless otherwise

specified, all proprietary materials shall be used and placed in strict accordance with the published instructions of the relevant manufacturer.

CWD01SC 4 TESTING

CWD01SC 4.1 Principles

The Contractor shall carry out sufficient controls, tests and checks to the approval of the Engineer (refer also Clause CWD01SC 4.2 to ensure that the materials used and the workmanship (i.e. the quality of construction, adherence to tolerances and, when applicable, the strength and other properties attained) comply consistently with the specified requirements and the results of those tests and checks shall immediately be made available to the Engineer unless otherwise approved. The Engineer may as part of his quality monitoring take such samples, conduct such tests and carry out such checks as he deems necessary at any point or at any depth or on any layer or lift or on any item as applicable, and the results of the Engineer's checks shall be made available to the Contractor. The Contractor shall provide all assistance and facilities as may be required by the Engineer to take samples, conduct tests and carry out checks.

CWD01SC 4.2 Quality Management

The Contractor's quality control or management shall be carried out in accordance with ISO 9000 Series of Codes of Practice for Quality Systems. Prior to the commencement of any activity the Contractor shall submit to the Engineer for his approval details of the quality control procedures he intends to follow for that particular activity.

CWD01SC 5 MEASUREMENT AND PAYMENT

CWD01SC 5.1 Measurement

CWD01SC 5.1.1 Method of Measurement, All Sections of the Schedule

Measurement shall be the net actual quantity if each item of the Permanent Works and the method of measurement shall be in accordance with the Bill of Quantities or other applicable schedules.

CWD01SC 5.2 Payment

CWD01SC 5.2.1 Fixed-charge and Value-related Items

The sum tendered for each fixed-charge and value-related item will be paid in a single payment in terms of the first progress certificate issued after the Contractor's obligations in respect of that item have, in the opinion of the Engineer, been discharged.

CWD01SC 5.2.2 Time-related Items

Payment for time-related items will be effected as follows only after payment for the relevant fixed-charge item has been made. Payment of incremental amounts (calculated by the division of the remainder of the tendered sum by the number of months required to complete the Site activities for which the relevant sum was tendered) will be authorised in each of the subsequent progress certificates until the sum tendered has been paid.

CWD01SC 5.2.3 Withholding of Certification for Payment for Time-related Items by the Engineer

- a. Should the Contractor fail to continue to provide all or part of the services or to meet all or part of the obligations and liabilities required of him in a particular period in respect of any time-related item, certification for payment of all or part of the relevant incremental amount for that item may be withheld until the required service has been provided or the obligation or liability has been discharged.
- b. Should the Contractor fail to continue entirely to provide all or part of the continuing services or to meet all or part of the continuing obligations and liabilities required of him in respect of a time-related item, the amount or part of the amount for the item will be omitted from the certificates and the total amount of the Contract reduced accordingly.

CWD01SC 5.3 Scheduled Fixed-charge and Value-related Items

CWD01SC 5.3.1 Establishment of Facilities for Contractor on Site

Unit: Sum

The sums shall cover the cost of providing, establishing and commissioning on the Site these facilities adequately equipped to allow the work to commence and to proceed to completion as required in terms of the Contract.

CWD01SC 5.3.2 Removal of Site Establishment

Unit: Sum

The sum shall cover the cost of the demolition on and the removal from the surface of the Site of all items established to complete works and shall provide for the making good and the restoring of the Site to the satisfaction of the Engineer.

CWD01SC 5.3.3 Temporary de-establishment

Unit: Sum

The sum shall cover the cost of discontinue work on instruction due to the phased availability of work place, including removal of equipment and personnel if necessary.

CWD01SC 5.3.4 Re-establishment after temporary de-establishment

Unit: Sum

The sum shall cover the cost of re-establishment after temporary de-establishment, including return of equipment and personnel. sum shall cover the cost of the demolition on and the removal from the surface of the Site of all items established to complete works and shall provide for the making good and the restoring of the Site to the satisfaction of the Engineer.

CWD01SC 5.4 Scheduled Time-related Items

CWD01SC 5.4.1 Health and Safety and Environment

Unit: Sum

The sum shall cover all the Contractor's time-related costs related to complying with Health and Safety standards and the Environmental Requirements including the appointment of dedicated Construction Supervisor and Health and Safety Officer and up keeping of records and registers.

Payments for these items do not absolve the Contractor from his responsibilities and liabilities in terms of Regulation 30 of the Construction Regulations 2003

CWD01SC 5.4.2 Supervision for Duration of Construction

Unit: Sum

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 foremen (where applicable), site surveyors, timekeepers, assistants and other Site supervisory staff, and of transport incurred in connection with such staff

PARTICULAR SPECIFICATION CWD01 HS HEALTH AND SAFETY

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1. SCOPE

This specification covers the health and safety requirements to be met by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2003, and all other safety codes and specifications referred to in the said Construction Regulations.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2003, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

Monitoring of compliance on site shall be to the requirements of the Occupational Health and Safety Act and Regulations as well as the contents of the Health and Safety Plan(s) (H&S Plan(s)) of the Principal Contractor and Contractors.

2. APPLICATIONS AND INTERPRETATION

This document is to be read in conjunction with the following:

- Occupational Heath and Safety Act (Act 85 of 1993);
- All regulations published in terms of the Occupational Health and Safety Act;
- Construction Regulations (2003);
- SABS (SANS) codes referred to by the Occupational Health and Safety Act;
- · Contract documents; and
- Basic Conditions of Employment Act (Act 75 of 1997).

3. DEFINITIONS

For the purpose of this contract the following shall apply:

- (a) "Employer" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "client" as defined in the Construction Regulations 2003. "Employer" and "client" are therefore interchangeable and shall be read in the context of the relevant document.
- (b) "Contractor", wherever used in the contract documents and in this specification, shall have the same meaning as "Contractor" as defined in the General Conditions of Contract.

In this specification the terms "principal contractor" and "contractor" are replaced with "Contractor" and "subcontractor" respectively.

(c) "Mandatory", wherever used in the contract, includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or user.

For the purpose of this contract the "Contractor" will, in terms of the agreement contemplated in section 37(2) of the Occupational Health and Safety Act (OHSA) 1993, be the mandatory, responsible to comply with all provisions of OHSA 1993 and the Construction Regulations (CR) 2003.

- (d) "Engineer" where used in this specification, means the engineer as defined in the General Conditions of Contract (GCC). In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the client as defined in the Construction Regulations).
- (e) Health and Safety Plan means a document plan, which addresses hazards, identified and includes safe work procedures to mitigate, reduce or control the hazards identified.
- (f) Health and Safety Specification mans a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons.
- (g) Risk Assessment means a program to determine any risk associated with any hazard at a construction site, in order to identify the steps to be taken to remove, reduce or control such hazard.

Also refer to definitions given in the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations (2003).

4. TENDERS

The Contractor shall submit the following with his tender:

- (a) A documented Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The safety Plan must be based on the Construction Regulation 2003 and will be subject to approval by the Employer;
- (b) 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 2003;
- (c) A declaration to the effect that he made provision in his tender for the cost of the health and safety measure envisaged in the Construction Regulations.
- (d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safety in accordance with the Construction Regulations.

5. NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 3 of the Construction Regulations (2003), notify the Provincial director of the Department of Labour in writing if the following work is involved:

- (a) Construction work that will exceed 30 days of 300 person-days;
- (b) Working at a height greater than 3,0 m above ground or landings.

The notification must be done in the form of the pro forma included as Annexure A in the Construction Regulations (2003)

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

6. LEGAL DOCUMENTATION / APPOINTMENTS

The following documents must be provided in the Health and Safety Plan:

- Health and Safety Policy;
- Letter of good standing with the Compensation Commissioner, Federated Employers of similar insurer; and
- Health and Safety Organogram (or table, outlining the Health and Safety Team, as well
 as the appointment(s) they have under the Act and Regulations (reference to specific
 section/regulation applicable to appointment).

Example of Safety Organogram:

Tom Smith
Section 16(2)
Construction supervisor CR 6(1)

Dick King
Construction vehicle competent person CR 21(1)(j)
Excavation competent person CR 11(1)

Harry Hackett H & S Rep – Section 17(1)

 The competency of each member of Health and Safety Team must be provided and should include knowledge, training, experience & qualifications specific to the work or task being performed.

Signed copies of legal appointments must be provided in the Health and Safety Plan.

The following information must be provided in the Health and Safety Plan:

- Indicate the estimated number of employees to be working on site.
- Indicate the expected number of contractors to be appointed by the Principal Contractor.

7. RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 7 of the Construction Regulations 2003).

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, sub-contractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

Risk assessments of all required activities shall form an integral part of the Health and Safety plan.

All risk assessments shall be conducted in terms of an acceptable methodology, prior to commencement of work, according to the provisions of Regulation 7 of the Construction Regulations (2003) and should cover at least the following:

- Movement of construction vehicles;
- All work near overhead power lines and underground cables;
- Locating underground cables/ existing services;
- Hand excavation of trenches;
- Mechanical excavation of trenches;
- All work carried out inside trenches, including compacting, pipe lying, backfilling etc.;
- Temporary stockpiling and removal of excavated material;
- Transporting material;
- Cutting into existing sewage line;
- All work carried out from scaffolding;
- Exposure to raw sewerage;
- All work carried out on live electrical installations;
- Welding in confined spaces;
- Working at heights;
- Roof work;
- Cladding:
- Formwork / Support work;
- Demolition work;
- Working with hand tools;
- Working with portable electrical tools;
- Asphalting; AND
- All health hazards that can be present during any of the above activities and should include individual dusts, gases, fumes, vapours, noise, extreme temperatures, illumination, vibration and ergonomic hazards due to any of the above activities.

The above list is by no means exhaustive and should not be limited to these activities but must cover all activities that forms part of the said construction work. Each activity must be split down to individual tasks and all associated hazards identified and listed in the risk assessment. This ensures that critical tasks and subsequent critical hazards are not missed.

The risk assessment to be included in the Health and Safety Plan must clearly indicate:

- The methodology used to do the risk assessments;
- Frequency, likelihood and consequence;
- Breakdown of processes and activities covered; and
- High risks anticipated.

All risk assessments are to be conducted by a competent person as appointed under paragraph 6 of this document. The plan must include a declaration in this regard or the risk assessment must contain the signature(s) of these appointed persons.

8. APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

Health and Safety plan

The Contractor shall appoint his employees and any sub-contractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan. To this end the Employer, or the Engineer or Agent on his behalf, will, in terms of Regulations 4(1)(d) and 5(3)(c), carry out audits on a regular basis to ensure that the Contractor as well as any sub-contractors in his employ, do implement the Contractor's Safety Plan as well as the Employer's Safety Specifications in accordance with the Construction Regulations.

Health and safety induction training

The Contractor shall ensure that all employees under his control, including sub-contractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site. The Employer or the Engineer on his behalf will carry out audits from time to time to ensure compliance by the Contractor.

The Contractor shall ensure that every employee on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

9. APPOINTMENT OF SAFETY PERSONNEL

Construction Supervisor

The Contractor shall appoint a full-time **Construction Supervisor** with the duty of supervising the performance of the construction work. (Refer Regulation 6(1)). He may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works.

Constructions Safety Officer

Taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall appoint in writing a full-time or part-time **Construction Safety Officer** if so decided by the Inspector of the Department of Labour. The Safety Officer shall have the necessary competence and resources to perform his duties diligently. (Refer Regulation 6(2)). Provision will be made in the schedule of quantities to cover the cost of a dedicated construction safety officer appointed after award of the contract if so ordered by the Engineer.

Health and safety representatives

In terms of Section 17 and 18 of the Act (OHSA 1993) the Contractor, being the employer in terms of the Act for the execution of the contract, shall appoint a health and safety representative whenever he has more than 20 employees in his employment on the site of the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be a least one for every 100 employees.

The function of the health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular base, to participate in consultations with inspectors and to attend meetings on the health and safety committee.

Health and safety committee

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor (as employer), shall establish one or more health and safety committee(s) where there are two or more health and safety representatives at a workplace. The persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular intervals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of recommendations and reports made by the committee.

Competent persons

In accordance with the Construction Regulations the Contractor has to appoint in writing competent persons responsible for supervising construction work.

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with all requirements of the Construction regulations.

10. RECORDS AND REGISTERS

In accordance with the Construction Regulations (2003) the Contractor is bound to keep records and registers related to health and safety on site for periodic inspection by inspectors, the Engineer, the Employer, trade union officials and sub-contractors and employees. The following records and registers must be kept on site and shall be available for inspection at all times.

- (a) A copy of the OHSA 1993 Construction Regulation 2003;
- (b) A copy of the Client's Health and Safety Specification;
- (c) A copy of the Contractor's Health and Safety Plan (Regulation 4);
- (d) A copy of the Notification of Construction Work (Regulation 3);
- (e) A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer (Regulation 6(7));
- (f) A copy of the risk assessment described in Regulation 7;
- (g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
- (h) A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant (Regulation 21(1)(j)).

11. CONTRACTOR'S RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor, as employer in his own right in respect of the contract, will be responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations (2003).

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations (2003), and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations. Safety reminders in the form of a checklist of some of the more important aspects of safety as related to personnel on site, must be displayed at a prominent position at the site (see Annexure 1: Safety on the site of Works).

(a) Contractor's position in relation to the Employer (Client) (Regulation 4)

Section 4 of the Regulations by implication requires that the Contractor shall at all times liaise closely with the Employer, or the Engineer on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

(b) The Principal Contractor and Contractor (Regulation 5)

The Contractor for the contract under consideration is the equivalent of "Principal Contractor" as defined in Regulation 2(b) of the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2003.

(c) Supervision of construction work (Regulation 6)

The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 6 and as set out in paragraph 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 6.

(d) Risk assessment (Regulation 7)

The Contractor shall have the risk assessment made as set out in paragraph 7 above before commencement of the work, and it must be available on site for inspection at all times. The Contractor shall consult with the health and safety committee or health and safety representative(s) etc. on a regular basis to ensure that all employees, including subcontractors under his control, are informed and trained by a competent person regarding health hazards and related work procedures.

No subcontractor, employee or visitor shall be allowed to enter the site of works without prior health and safety induction training, all as specified in Regulation 7.

(e) Fall protection (Regulation 8)

Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Scaffolding (Regulation 14)

The Contractor shall ensure that all the provisions of Regulation 14 of the Construction Regulations are complied with. (Note: Reference in the Regulations to "Section 44 of the Act" should read "Section 43 of the Act")

(g) Construction vehicles and mobile plant (Regulation 21)

The Contractor shall ensure that all construction vehicles and pant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. Workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 21, shall only operate the vehicles and plant.

All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.

(h) Water environments (Regulation 24)

Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

(i) Housekeeping on Construction sites (Regulation 25)

Housekeeping on all construction sites shall be in accordance with the provisions of the environment Regulations for workplaces (Government Notice R2281 of 16 October 1987) and all the provisions of Regulation 25 of the Construction Regulations.

(j) Stacking and storage on construction sites (Regulation 26)

The provisions for the stacking of articles contained in the General Safety Regulations (Government Notice R1031 of 30 May 1986) as well as all the provisions of Regulation 26 of the Construction Regulations shall apply.

(k) Fire precautions on construction sites (Regulation 27)

The provisions of the environment Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 27 of the Construction Regulations.

(I) Construction welfare facilities (Regulation 28)

The Contractor shall comply with the constructions site provisions as in the Facilities Regulations (Government Notice R1593 of 12 August 1988) and the provisions of Regulation 28 of the Construction Regulations.

(m) Non-compliance with the Construction Regulations (2003)

The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects.

The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations applicable to the contract under consideration are complied with to the letter.

Should the Contractor fail to comply with the provisions of the Regulation 3 to 28 as listed in Regulation 30, he will be guilty of an offence and will be liable, upon conviction, to the fines of imprisonment as set out in Regulation 30.

THE CONTRACTOR IS ADVISED IN HIS OWN INTEREST TO MAKE A CAREFUL STUDY OF THE ACT AND THE CONSTRUCTION REGULATIONS, AS IGNORANCE OF THE ACT AND THE REGULATIONS WILL NOT BE ACCEPTED IN ANY PROCEEDINGS RELATED TO NON-CONFORMANCE TO THE ACT AND THE REGULATIONS.

12. TRAINING

Each Health and Safety Plan shall indicate the following regarding training:

- Name and contents of the following training courses which have to be conducted:
 - Induction Training;
 - Training regarding hazards identified and any corrective measures in place;
 - Training regarding all applicable regulations; and
 - Specific training regarding applicable competencies.
- Attendance registers must be kept as proof of training provided.
- Method of informing visitors and other persons entering the site of hazards prevalent site.
- Method providing personal protective equipment to visitors and non-employees.
- An example of ID training card for each employee (if used).
- Methodology to be used in the issuing and communicating of written instructions/safe work procedures.

13. GENERAL REQUIREMENTS

Personal Protective Equipment

The procedures for issuing and control over PPE shall be indicated in the Health and Safety Plan, as well as the enforcement for the wearing thereof.

Hired Plant

The responsibility for the safe condition and use of all hired plant shall be that of the contractor.

Transport of Employees

Transport of employees shall be carried out in terms of the National Road Ordinances.

The Health and Safety Plan shall detail the arrangements and methods of the transportation of workers.

Signs

The Principal Contractor shall indicate in his Health and Safety Plan the arrangements regarding the posting of danger signs.

Certificates of fitness

The Principal Contractor shall include in his H&S Plan copies of all employees that require medical fitness certificates under the following regulations where applicable:

 Construction Regulations (2003) Regulation 21 – Construction vehicles and Mobile plant operators.

Site Visitors Register

A site visitor's register is to keep on site and steps are to be taken to ensure that all visitors sign the visitor's register before entering the site. A sign should also be provided directing all visitors to report to the site officer.

14. MEASUREMENT AND PAYMENT

(a) Principles

It is a condition of this contract that Contractors, who submit tenders for this contract, shall make provision in their tenders for the cost of all health and safety measures during the construction process. Special reference is made to the following:

i. Safety personnel

All safety personnel and competent persons referred to in clauses 9 will normally be members of the Contractor's personnel, and no additional payment will be made for the appointment of such safety personnel.

However provision will be made in the schedule of quantities for payment under the contract for a Construction supervisor in terms of Clause 7.1 and for a dedicated Construction Safety Officer in terms of Clause 7.2 on the instruction of the Inspector of the Department of Labour.

ii. Records and Registers

Provision will be made in the schedule of quantities for payment to the Contractor for the keeping of health and safety-related records and registers as described in Clause 8.

(b) Scheduled items

Payment will be done under:

CWD01SC 5.4.1 Health and Safety and Environment Unit: Sum
The sum shall cover all the Contractor's time-related costs related to complying with Health and
Safety standards and the Environmental Requirements including the appointment of dedicated
Construction Supervisor and Health and Safety Officer and up keeping of records and registers.

Payments for these items do not absolve the Contractor from his responsibilities and liabilities in terms of Regulation 30 of the Construction Regulations 2003

ANNEXURE 1: SAFETY ON THE SITE OF WORKS

The basic day-to-day requirements for safety on the site of works are listed below. Compliance with these aspects does not relieve the Contractor of any of his obligations and responsibilities detailed in Regulations 4 to 28 referred to paragraph 9 of the Safety Specification.

1. Fall protection

- (a) All unprotected openings in floors, slabs, hatchways and stairways must be adequately guarded, fenced or barricaded or similar means must be used to safeguard any person from falling through such openings;
- (b) Notices must be placed conspicuously at all openings where the possibility exists that a person might fall through such openings;
- (c) Where roof work is being performed on a construction site, the contractor shall ensure that:
 - (1) No employees are permitted to work on roofs during inclement weather conditions of if weather conditions are a hazard to the health and safety of the employees:
 - (2) Prominent warning notices are to be placed where all covers to openings are not of sufficient strength to withstand any imposed loads and where fragile material exists; and
 - (3) There is suitable and sufficient guard-rails or barriers and toe-boards or other similar means of protection to prevent, so far as is reasonably practicable, the all of any person, material or equipment.

2. Cranes

The Contractor shall ensure that where tower cranes are use, that:

- (a) The tower crane operators are competent to carry out the work safely; and
- (b) The tower crane operators are physically and psychologically fit to work in such an environment by being in possession of a medical certificate of fitness.

3. Construction vehicles and mobile plant

- (a) The contractor shall ensure that all construction vehicles and mobile plant; are operated by workers who:
 - (1) Have received appropriate training and been certified competent and been authorized to operate such machinery; and
 - (2) Are physically and psychologically fit to operate such construction vehicles and mobile plant by being in possession of a medical certificate of fitness.
- (b) The Contractor shall furthermore ensure that:
 - (1) No person rides or be required or allowed to ride on any construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
 - (2) Vehicles used to transport employees have seats firmly secured and adequate for the number of employees to be carried; and
 - (3) When workers are working on or adjacent to public roads, reflective indicators are provided and worn by the workers.

4. Use and temporary storage of flammable liquids on construction sites

- (a) The Contractor shall ensure that:
 - Where flammable liquids are being used, applied or stored at the workplace concerned, it is done in a manner that would not cause fire of explosive hazards, and that the workplace is effectively ventilated. Where the workplace cannot effectively be ventilated:

- (a) Every employee involved must be provided with a respirator, mask or breathing apparatus of a type approved by the chief inspector, and
- (ii) Steps must be taken to ensure that every such employee, while using or applying flammable liquids, uses the apparatus supplied to him or her.
- (b) No person smokes in any place in which flammable liquid is used or stored, and the contractor shall affix a suitable and conspicuous notice at all entrances to any such areas prohibiting smoking;
- (c) An adequate amount of efficient fire-fighting equipment is installed in suitable locations around the flammable liquids store with the recognized symbolic signs.

5. Fire precautions on construction sites

The contractor shall ensure that smoking is prohibited and notices in this regard are prominently displayed in all places containing combustible or flammable materials.

6. Construction welfare facilities

- (a) The contractor shall, depending on the number of workers nd the duration of the work, provide at or within reasonable access of every construction site, the following clean and maintained facilities:
 - (1) At least one shower facility for every 15 workers;
 - (2) At least one sanitary facility for every 30 workers;
 - (3) Chancing facilities for each sex; and
 - (4) Sheltered eating areas.
- (b) The Contractor shall also ensure that:
 - (1) No horseplay between employees or aggressive or threatening behaviour by anybody is allowed on site;
 - (2) Workers shall wear appropriate protective clothing for particular tasks, including protective eyewear, gloves, boots, ear protection, masks, etc. Workers shall not be allowed to wear loose clothes of footwear.
 - (3) Workers executing tasks in manholes for sewer and storm water systems shall be made aware of the existence of hazardous gasses in closed areas, and shall be issued with masks as necessary. Only specialists shall be allowed to work in gas-filled chambers;
 - (4) Blasting must be done by specialists in accordance with the Explosive Act;
 - (5) Workers shall not be allowed to make open fires on any part of the site, unless in designated areas approved by the health and safety manager;
 - (6) No vehicle or equipment shall be operated on site if it produces noise above 90 decibels, measured at a distance of 10m from the unit;
 - (7) Adequate signage shall be used on site to indicate:
 - Non-smoking areas on the site;
 - Safety exits / emergency exits from buildings under construction;
 - Stairs (temporary and permanent works);
 - Toilets;
 - Fire fighting equipment;
 - Fire assembly points;
 - Fire escapes;
 - Overhead works;
 - Areas where members of the public are not allowed; and
 - First aid facilities.
 - (8) Visitors to the site shall only be allowed to enter the site by pre-determined procedures, including safety induction training. Records of visitors shall be kept in the health and safety files.

PARTICULAR SPECIFICATION CWD08 ROCK SUPPORT (COMBINED)

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PARTICULAR SPECIFICATION CWD08 ROCK SUPPORT

CWD08.1. SCOPE

This section covers the requirements for steel rock dowels, geo-nails, rock bolts and shotcrete. It includes the requirements for the supply and standards of materials, storage, installation and testing of rock dowels, geonails, rock bolts and shotcrete.

CWD08.2. DEFINITIONS

The following shall apply:

"Bearing plate": A steel plate between the anchor head and the surface of the ground, rock or structure requiring support, to distribute the load into the ground, rock or structure.

"Characteristic strength": The manufacturer's guaranteed tensile strength of the pre-stressing steel below which not more than 5% of test results in a statistical population are expected to fall.

"Distal": Situated furthest from the rock surface.

"Fixed tendon": The distal part of the tendon which transmits the tensile load to the surrounding rock or ground.

"Fixture": An item such as a bolt, anchorage, bearing plate or the like, cast or grouted into concrete.

"Geo-nail": Means a straight high yield deformed bar of specified diameter and length (in rock) with one end threaded, which is fully grouted with cement grout and equipped with a washer/faceplate and nut and which is not tensioned.

"Rock bolt": Means a high yield deformed bar of specified diameter and length (in rock) which is end anchored with resin or cement grout, fully column bonded with resin or cement grout, equipped with a faceplate, hemispherical washer and nut and tensioned to a specified load. The use of resin or cement grout shall be at the Contractor's discretion, unless specifically detailed on the Drawings.

"Dowel": Means a high yield deformed bar of specified diameter and length (in rock) for which the protruding portion may be either straight or bent, which is fully grouted with cement grout. Dowels will not be fitted with accessories nor will they be tensioned.

"Secondary grouting": The grouting of the free tendon after stressing to bond and/or protect the free tendon.

"Tendon": The part of a rock bolt or rock anchor that is capable of transmitting the tensile load from the distal fixed tendon or fixed anchorage to the proximal free anchorage. A tendon may consist of one or more bars, wires or strands.

"Working load": The load which the rock anchor has been designed to carry when in place after lock-off. This is a factored load to which a factor of safety has been applied.

"Ulti mate load": The load which is the product of the characteristic strength of the steel and the cross-sectional area of the tendon.

CWD08.3. MATERIALS

CWD08.3.1. General

The rock bolts, geo-nails and rock dowels used in the Works shall be as proposed by the Contractor and approved by the Engineer and shall incorporate such modifications as the Engineer may direct from time to time. The Contractor shall ensure that his proposals conform to the requirements of this specification and also incorporate all of the features that are indicated for the typical rock bolts, geo-nails and rock anchors that have been shown on the Drawings.

The Contractor shall submit to the Engineer a Method Statement with full details of his proposals for the rock bolts, geo-nails and rock dowels including details of the fixed and free anchorages, stressing methods, grouting methods and grouting materials at least seven days prior to the Contractor requiring the approval of the proposed rock bolt system.

Rock bolts, geo-nails and dowels shall be manufactured from hot rolled deformed bars with a characteristic strength of not less than 450 MPa complying with BS 4449 (SANS 920).

Face plates, hemispherical washers and nuts for rock bolts and geo-nails shall be manufactured to suit the loading requirements.

Where directed by the Engineer or shown on the Drawings, corrosion protected rock bolts, geo-nails or dowels shall be used. Corrosion protection will consist of a two part epoxy protective coating using SIKAGUARD 63N or equal. colour of SIKAGUARD 63N for approval by Engineer.

The quantities of materials on site shall at all times be sufficient for the programmed rate of construction and anticipated ground conditions.

CWD08.3.2.Rock Dowels

Rock dowels shall meet the appropriate requirements for reinforcement given in Particular Specification CWD32. The bars shall be cut and bent as shown on the Drawings and in accordance with the appropriate requirements of Particular Specification CWD32. They shall be of such length to enable a minimum anchorage in rock of 4,0 m except where otherwise specified.

CWD08.3.3. Geo-nails

Geo-nails shall be manufactured from high yield deformed bar conforming to SANS 920 and meet the appropriate requirements for reinforcement given in CWD32.

Geo-nails shall be straight bars with diameters and lengths as specified or shown on the Drawings. The bar length specified shall be the required length of bar to be bonded into the rock and due extra allowance in the cutting length shall be made for the threaded portion of the bar protruding from the rock face. One end of the bar shall be threaded for at least 150mm with a coarse cut thread which shall not reduce the overall specified bar diameter by more than 3mm.

Face plates shall be 150mm by 150mm by 8mm thick (or similar) and fitted with a suitable washer to permit seating of the face plate at inclinations up to 30° from the normal to the bar axis where required.

The Contractor will be permitted to use deformed bar geo-nails of equivalent lengths with hot rolled thread.

Where specified corrosion protection of geo-nails and accessories will be required.

CWD08.3.4.Rock bolts

The free tendons of rock boits shall consist of steel studs of high yield steel conforming to SANS 920. These shall be of types having the following minimum service loads:

Light bolts

100 kilo new tons

Heavy bolts

150 kilo new tons

In respect of each consignment of rock bolts, the Contractor shall supply the Engineer with copies of the manufacturer's test certificates confirming that the studs do comply with SANS 920.

The dimensions of the rock bolts shall be such that the working stress in the threaded section nowhere exceeds 55% of the characteristic strength as specified in SANS 920. Hollow core studs will be permitted where rock bolts are to be installed at an upward inclination, but the Contractor shall ensure that no non-ferrous metals forming part of the grouting system are left inside the grout.

The steel of rock bolts and their associated fittings shall be free of loose rust, mill scale, grease, soap and other coatings. Contaminated or damaged steel shall not be used in the Works.

The lengths of the rock bolts shall be as shown on the Drawings or ordered by the Engineer. Each rock bolt shall be fitted with a Bail-type expanding fixed distal anchorage approved by the Engineer. Fixed anchorages which require the rock bolt to be driven on to a wedge to cause expansion shall not be used. The proximal end of the stud shall be provided with a 150mm long cold rolled thread and the proximal anchorage shall comprise a plastically deformable circular dished washer, aligning hemispherical seat and plain washers and nuts to suit. The dished washers shall be capable of permitting rock inclinations up to 30 degrees from the normal to the stud. The dished washers shall be at least 5mm thick with a minimum diameter of 125mm for light bolts and 150mm for heavy bolts.

All parts of the rock bolt assembly including the anchorages shall be designed such that none of the components will fail below 1,8 times the working load of the rock bolt. Flat and tapered washers shall meet the requirements of the appropriate section of SANS 1700.

CWD08.3.5.Rock Anchors

Under this contract Rock Anchors will be regarded as Rock bolts or Geo-nails as directed by Engineer.

CWD08.3.6. Storage of Rock Dowels, Geo-nails and Rock bolts

The rock dowels and geo-nails shall be stored and cleaned prior to installation in accordance with the appropriate requirements tor reinforcement given in CWD32.

Rock bolts and the materials for their manufacture or assembly shall be stored in weatherproof buildings and be protected from environments which can cause deterioration, contamination or damage to the rock bolts and their accessories. Material that has deteriorated, become contaminated or that has been damaged shall not be used in the Works.

CWD08.3.7. Centralizers for Rock Dowels, Geo-nails and Rock bolts

Centralizers shall be manufactured from metal or plastic and shall be of such a design that air cannot be trapped during the grouting operation.

CWD08.3.8. Grouting Materials

The material used in the grouting of rock dowels, rock bolts and rock anchors shall be in accordance with the relevant requirements of Particular Specification CWD25. Resin grouts shall not be used unless approved by the Engineer.

Admixtures shall only be used if approved by the Engineer and shall have been proved not to have long-term harmful effects on pre stressing steel. Admixtures shall not contain chlorides, nitrates, sulphides or sulphites. When aluminium powder is used, the total expansion of the grout shall not exceed 10%.

The material used in the grouting of rock dowels, geo-nails and rock bolts shall be an approved cementitious non-shrink grout SIKAGROUT-212 or equal as approved by the Engineer.

CWD08.4. PLANT

CWD08.4.1 General

All plant and equipment shall be of the most modern type with adequate capacity, in good mechanical order and suitable for doing the work. All plant and equipment shall be satisfactorily maintained to ensure continuous and efficient performance at all times. The numbers of plant and equipment on Site shall at all times be sufficient for the programmed excavation rate and anticipated ground conditions. Prior to commencing the construction of any rock support, the Contractor shall submit to the Engineer tor his approval full details of all plant and equipment he proposes to use.

CWD08.4.2. Drilling Equipment

The equipment used to drill holes for rock dowels, geo-nails and rock bolts shall be in accordance with the requirements of CWD23. Hand held drills may be used to drill holes for rock dowels if the Engineer is satisfied that the required collaring and directional tolerances can be achieved.

CWD08.4.3. Grouting Equipment

The equipment used for grouting rock dowels, geo-nails and rock bolts shall be in accordance with the requirements of CWD25 as appropriate for the task. and shall also include additional equipment such as hand pumps and displacement tanks. The mixing equipment provided by the Contractor shall be capable of producing grout of a uniform and smooth consistency and the equipment shall incorporate suitable screens for removing lumps and other foreign materials from the grout The pumping equipment provided by the Contractor shall be capable of developing pressure of at least 0,7MPa. Each pump shall be fitted with a pressure gauge and with a controlling device that will effectively prevent the build-up of excessive pressure.

CWD08.4.4. Stressing Equipment for Rock bolts

Rock bolts shall be tensioned by means of a hydraulic rock stud tensioner of a design approved by the Engineer. The tensioner shall be capable of applying a pre-selected tension to the stud prior to tightening the nut, without the risk of overstressing the stud. Sufficient facilities shall be fitted to the tensioner to ensure that after tightening the nut the stress in the stud will be maintained after removal of the tensioner. The Contractor shall provide calibration equipment on Site to the satisfaction of the Engineer to ensure that the tensioners being used will apply the required loads to a tolerance of 5% or less.

The Contractor shall provide the necessary facilities for measuring the extension of each stud to a tolerance of 2% or less of the calculated elastic extension of the stud under test load or 2mm, whichever is the smaller value.

CWD08.5. CONSTRUCTION

CWD08.5.1, General

The various systems described in this specification shall not preclude the use by the Contractor of other systems, subject to the prior approval of the Engineer. If required by the Engineer, the Contractor shall use only the support systems ordered by the Engineer in particular portions of the Works, due regard being had of the permanence of the proposed support systems.

Every aspect of the installation of rock dowels, geo-nails and rock bolts shall be carried out by personnel who, in the opinion of the Engineer, have adequate suitable experience of similar installations.

Details of staff to be employed including past experience with the techniques to be employed shall be submitted to the Engineer for his approval at least seven days prior to commencement of the work.

Rock support shall be installed in the positions and to the dimensions, grades and sizes ordered by the Engineer or shown on the Drawings. The sequence of installing the various support systems shall be as approved or ordered by the Engineer from time to time. Unless otherwise shown on the drawings or approved by the Engineer, no rock support shall project beyond the excavation clearance line.

The Contractor shall install the various types of rock support with due expedition and without delay, which work shall take precedence over any other work insofar as it affects the safety of the Works. The Contractor shall, except to the extent indicated otherwise hereinafter, conduct regular tests on the quality of the materials and methods employed and the accuracy of all instruments at such frequencies and using such methods and in accordance with a quality control programme as the Engineer may approve from time to time. Copies of all test results shall be deposited with the Engineer upon completion of each test.

The Contractor shall conduct full-scale tests to destruction of such rock bolt assemblies as the Engineer may order from time to time. The purpose of these tests shall be to check the effectiveness of the various installations and installation methods. Where the installations fail at loads less than the specified characteristic strength and the cause of such failure is not due to poor ground or rock conditions the Contractor shall replace, repair or make good such defective units and such other defective units of which the test may be representative.

Where defective units are encountered the Contractor shall conduct such regular tests, including tests to destruction as the Engineer may order, to ensure that the cause of the defect has been overcome and to ensure that the minimum requirements are being maintain

Intensified testing shall be required whenever systems, materials or methods are being employed on Site by the Contractor for the first time.

Where approved additives are added to grout mixes, these shall be tested weekly to ensure that the desired properties are imparted to the grout or concrete and to ensure that none of the other properties are being affected detrimentally, Whenever a new batch or consignment of additives is intended for use in the Works this shall first be tested prior to use.

CWD08.5.2. Safety Precautions

The Contractor shall take particular precaution during and after tensioning to protect persons from injury and equipment from damage that may be caused by a sudden release of stored energy in the event of failure of any anchorage or equipment.

CWD08.5.3. Holes for Rock Dowels, Geo-nails and Rock bolts

CWD08.5.3.1. Drilling of Holes

The drilling of holes for rock dowels, rock bolts and rock anchors shall conform to the requirements of Particular Specification CWD23.

The holes shall be drilled using the rotary percussion method or such other method as approved by the Engineer and be of the diameters shown on the Drawings or approved by the Engineer. Only water and/or air shall be used as a drilling fluid and for flushing of the hole and this shall be free from oil, grease or other contaminants which could affect the bond between the rock and the grout.

The holes shall be drilled at the positions and the inclinations and to the depths shown on the Drawings, or as ordered by the Engineer and within the tolerances specified in Clause CWD27.6 of this specification, unless this is precluded by rock conditions.

The Contractor shall ensure that each tendon will be anchored in rock capable of resisting the required loads and any fixed anchorage that is damaged or that cannot transmit the required load due to slipping of the fixed anchorage shall be made good by the Contractor to the approval of the Engineer, if such poor rock condition had not previously been reported to the Engineer. Should there be indications of poor rock at the depth of the fixed anchorage, such conditions shall be reported to the Engineer and such holes shall be extended to the depths ordered by the Engineer to ensure adequate load transfer by the fixed anchorage. The tendon lengths shall be adjusted to suit the actual depth of hole drilled.

On completion of drilling, the hole shall be cleaned by flushing in accordance with the requirements of Particular Specification CWD24 using water and air with particular attention being paid to clearing all accumulations at the base of the hole. The alignment and depth of the hole shall be checked to confirm that it is within the specified tolerances.

CWD08.5.4. Grout for Grouting Rock Dowels, Geo-nails and Rock bolts

The material used in the grouting of rock dowels, geo-nails and rock bolts shall be an approved cementitious non-shrink grout SIKAGROUT-212 or equal as approved by the Engineer.

In the case that the Engineer approve ordinary grout ,the Contractor shall ensure that the grout used for grouting rock dowels, geo-nails and rock bolts has good fluidity and low sedimentation (i.e. low tendency to bleed) in the plastic state and develops acceptable durability and density with low shrinkage in the hardened state. The grout shall consist of Ordinary Portland Cement and water mixed in the ratio 2,5: 1 by weight to have the consistency of thick cream. The Contractor shall only include additives in such proportions as the Engineer may approve if deemed necessary to reduce the shrinkage. When so required by the Engineer, the Contractor shall undertake bleeding tests or grouting trials, or both. The grout shall be such that, when it is tested for bleeding in accordance with Clause CWD08.10.1 of this specification, bleeding shall not exceed 2% after 3 hours or 4% maximum when bleeding is complete and the bleed water shall be re-absorbed fully after 24 hours. Cubes (of sides 150mm) made of the grout and cured at a temperature of 22°C to 25°C and a relative humidity of at least 90% for the first 24 hours and then kept in water at 22°C to 25°C, shall have a compressive strength exceeding 40MPa at 28 days.

At least one month before the commencement of grouting of rock dowels, geo-nails and rock bolts, tests shall be carried out by the Contractor to determine whether the grout complies with the requirements of this specification for fluidity, bleeding and compressive strength. After a grout mix design that yields a grout complying with the said requirements has been agreed upon between the Contractor and the Engineer, the mix design shall not be altered unless trial mixes of any altered mix are made and tested and the written approval of the Engineer for use of the altered mix has been obtained.

When grout is mixed, water shall be added to the mixer first and then the cement. Only after the water and cement have been thoroughly mixed, shall any admixture be added. Mixing shall then be continued until a uniform consistency is obtained but, in any event, for at least 2 minutes. Mixing shall not be done by hand.

Grouting of rock dowels, geo-nails and rock bolts shall not take place at air temperatures below 5 °C or if the air temperature is likely to fall below 5°C during the 48-hour period following the placing of the grout.

CWD08.5.5.Installing Rock Dowels and Geo-nails

Immediately prior to installing the rock dowel or geo-nail the drilled hole shall be flushed by inserting a suitable pipe or tube down to the bottom of the hole and pumping in a mixture of water and compressed air while moving the pipe up and down, to the bottom of the hole, until the wash water runs clear, where-after the hole shall be blown dry to remove all the remaining water..

The reinforcing bar shall be cleaned of all loose and deleterious material that may impair its bond with the cement grout. The centralizers shall be fitted at adequate intervals along the length of the bar as approved by the Engineer. The hole shall be filled with grout, conforming to the requirements of Clause CWD08.5.4 of this specification, from the bottom of the hole. Within a few minutes of placing the grout the bar shall be inserted to the correct length with particular care not to damage or displace the centralizers. The bar shall be vibrated for 20 to 30 seconds to allow the grout to settle around the bar, where after the hole shall continuously be kept full of grout until the grout has set. The bars shall be provided with the necessary supports to hold them firmly in position until such time as the bond between the bar and the grout cannot be damaged. Rock dowels shall generally be set in position at least 7 days prior to casting the surrounding concrete, unless otherwise directed by the Engineer.

When the grout has gained the required strength (normally after 7 days), the face plate, washer and nut of the geo-nail shall be attached and the nut tightened, but not stressed. Where required, the face plate shall be positioned to retain mesh reinforcement.

If any rock dowel or geo-nail becomes damaged in any way the Contractor shall repair or replace the affected item to the satisfaction of the Engineer.

Rock dowels and geo-nails shall be tested as required in Clause CWD08.1 0.2.

CWD08.5.6.Installing Rock bolts

The method of installation and tensioning of bolts shall be to the approval of the Engineer. Manufacturer's instructions for the use of proprietary components shall be followed wherever appropriate.

Unless otherwise proven acceptable by Site trials the rock bolts shall be installed in percussion drilled holes of diameter from 10 mm to 15 mm greater than the maximum diameter of the rock bolt. Holes in excess of this diameter shall be abandoned and re drilled. The holes shall not be more than 100 mm longer than the grouted length of the rock bolt unless otherwise proven acceptable by Site trials.

Immediately prior to installing the rock bolt the drilled hole shall be flushed by inserting a suitable pipe or tube to the end of the hole and pumping in a mixture of water and compressed air while moving the pipe in and out until the wash water runs clear.

The rock bolt and its accessories shall be thoroughly cleaned to remove all loose or other material that may impair its bond with the cement grout. The centralizers shall be installed at adequate intervals along the rock bolt as approved by the Engineer. The rock bolt shall be installed into the hole with particular care not to damage or displace the centralizers.

End cartridges for the anchorage zone may be of fast setting resin or cement grout, whilst the free length above the anchorage zone shall be filled with normal setting cement grout. Tensioning shall be carefully controlled to ensure that it takes place after anchorage zone grout has developed the required strength. The free length above the anchorage zone shall also only be filled with grout after the anchorage zone grout has developed the required strength and shall be filled upwards from the anchorage zone.

The plain and dished washers, hemispherical seat and nut shall be attached and the rock bolt tensioned using the hydraulic tensioner. The rock bolts shall be tensioned to 100kilonewton.

Tensioning of rock boits shall preferably be carried out by means of a device imparting a direct pull to the boit. The device shall be fitted with a gauge to indicate the tension in the bolt and shall be calibrated at regular intervals and when directed by the Engineer. The use of a torque wrench or similar tool shall be subject to the approval of the Engineer.

Rock bolts shall be tested as required in Clause CWD08.10.3.

CWD08.5.7. Installing Rock Anchors

Not applicable.

CWD08.5.8. Maintenance of Rock Dowels, Geo-nails and Rock bolts

If a bolt, geo-nail or dowel is damaged by blasting operations or becomes ineffective due to any cause, it shall be repaired or additional bolts, geo-nails or dowels shall be installed. Such repair or replacement of damaged or ineffective bolts, geo-nails or dowels shall be carried out by the Contractor without additional payment.

CWD08.5.9. Records

The Contractor shall maintain a systematic set of records in respect of the installation of each rock dowel, geonail and rock bolt and copies of all records shall be handed to the Engineer on completion of each individual installation. The records shall include the following where applicable as well as such additional information as the Engineer may require from time to time:

- (a) Number, location and type of rock support
- (b) Drill type, hole diameter, drill pressure, drill strokes per minute, drill rotational speed, and bit age
- (c) Details of strata penetrated together with rate of penetration and date and time of drilling
- (d) Hole depth and orientation
- (e) Particulars of gain or loss of drilling fluid
- (f) Details of stoppages
- (g) Details of personnel employed

- (h) Grout quantity injected
- (i) Date and time of tensioning
- (j) Tension readings and their relevant data
- (k) Date and time of testing, type of test, relevant readings and data
- (i) Mix proportions of all grout injected

If any of the above procedures are repeated at any stage, the relevant information listed above shall be recorded at each stage.

CWD08.6. TOLERANCES

CWD08.6.1. Drill Holes

Each hole shall be drilled within 75mm of the position specified on the Drawings or otherwise ordered by the Engineer. The deviation of the hole at any point shall not vary from the alignment specified on the Drawings by more than 2% of the depth of the hole to that point, as measured by the Engineer. The depth of the hole shall ensure that the distal fixed anchorage can be positioned within 25mm of the specified position and shall not be more than 100mm longer than the specified length of the tendon or the length ordered by the Engineer

CWD08.6.2 Rock Dowels and Geo-nails

The tolerances for cutting and bending of the rock dowels and geo-nails shall be as specified for the appropriate size of reinforcement in CWD32.

CWD08.6.3 Rock bolts

The length of installed rock bolts shall allow the distal fixed anchorage to be installed within 25mm of its specified position.

CVWD08.7 WELDED MESH REINFORCEMENT (Not applicable ?)

Welded mesh reinforcement shall comply with CWD32 - Reinforcement.

The mesh shall be securely fixed as more fully described below, generally in hollows at the optimum distance from the rock face for the application process such as to minimise shotcrete rebound and prevent voids. The minimum cover between the mesh and the exposed face of the shotcrete shall be 25 mm, or a greater cover if ordered by the Engineer, or shown on the drawings. The mesh shall be set at a nominal distance of 20 mm from the rock face. Joints shall be lapped by two full squares. Where welded mesh is used without initial shotcrete support, all loose material behind the welded mesh shall be completely removed before concrete is placed against the rock face. The welded mesh may be cut open to remove loose rock prior to lining. Continuity of the welded mesh shall be restored if required for safety but otherwise the welded mesh shall be trimmed neatly so that there are no loose portions which might interfere with the concreting operation.

CWD08.8. DOUBLE TWISTED WIRE MESH

Double twisted wire mesh rolls shall be used for the protection of slopes and cliffs where there may be danger of falling rocks. All wire shall be mild steel to SANS1373, zinc coated by hot-dip galvanising to SANS 675 and, for PVC coated wire mesh, heat bonded through extrusion with a 0,5 mm heavy duty coating to SANS 1580. Mesh shall be provided in rolls of mesh Type 80 as per Table 8/1.

TABLE 8/1: DOUBLE TWISTED WIRE MESH ROLLS

Mesh Type	Wire (mm)	External Wire Diameter (mm)	Roll Size (mm)	Roll Diameter (mm)
	Galvanised	2,7	25 X 2	350
80			50 X 2	480
	PVC	3,7	25 X 2	410
			50 X 2	570

Where double twisted mesh is used with shotcrete it shall be fixed as required for welded steel mesh Refer to Section 13 - Reinforcement.

CWD08.9. SHOTCRETE

CWD08.9.1. General

The Engineer may direct that shotcrete be applied to the rock surface as soon as possible after excavation. Areas to be treated shall be agreed with the Engineer before the application.

Shotcrete shall be applied to both clear and mesh reinforced faces and to the final thickness all as specified on the Drawings or ordered by the Engineer. Large radius irregularities will be permitted, but local roughness and re-entrant angles are to be covered.

Shotcrete shall be applied by the wet mix process.

Where specified by the Engineer shotcrete shall be applied in one or more layers to reach the specified total thickness.

After completion, the shotcrete is not to be touched up, trowelled, smoothed off or worked in any way, but left undisturbed unless otherwise specified.

CWD08.9.2. Materials

CWD08.9.2.1. Cement, Cement Extenders and Water

Cement, cement extenders, and water shall comply with the requirements of CWD32. Silica fume shall comply with the requirements of SANS 1 491 Part 3, but shall not be used unless approved by the Engineer.

CWD08.9.2.2 Aggregates

Aggregates shall comply with the requirements of CWD32 - Concrete except for grading requirements, which shall be as given in Table 8/2.

The nominal particle size shall be 10 mm unless otherwise agreed with the Engineer and the grading shall be within the envelope given in Table 8/2 unless approved otherwise or specified elsewhere.

TABLE 8/2: AGGREGATE GRADING LIMITS

Sieve Size (mm)	Percentage Pa	assing by Mass
((ASTM)	Maximum	Minimum
9.5	100	100
4.75	100	70
2.36	100	45
1.18	75	30
0.6	50	18
0.3	30	10
0.15	15	5

Aggregates with grading outside these limits will not be accepted unless the Contractor has demonstrated in full-scale trials that a satisfactory end product can be produced with such aggregates.

CWD08.9.2.3. Accelerators

Accelerators shall not be caustic or corrosive to reinforcement and shall be of a type with a history of satisfactory long-term performance. References shall be obtained from suppliers and submitted to the Engineer for approval.

CWD08,9.2.4. Compressed Air

Compressed air used in the process shall be clean, dry and free of oil.

CWD08.9.2.5. Steel Fibres

Steel fibres shall not be allowed, unless approved by the Engineer. Steel fibres shall comply with ASTM 820 Standard Specification for Steel fibre for Fibre Reinforced Concrete or such other Standard acceptable to the Engineer. A minimum fibre tensile strength of 1 000 MPa is required.

Steel fibres shall be Type 1 deformed of equivalent diameter 0,5 mm and aspect ratio of 40 to 80 or such type acceptable to the Engineer. The length of fibre should not exceed 70% of the internal diameter of the hoses or pipes to prevent blockage.

CWD08.9.3. Design of Shotcrete

Shotcrete shall meet the requirements specified in Table 8/3. The mix design shall be carried out by the Contractor and details submitted to the Engineer.

The mixes for shotcrete shall be within the following proportions:

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Cementitious content (kg/m³)	330 -	450
Aggregate/cement ratio	3,0	5,0
Water/cement ratio	0,35	0,45
Silica fume (kg/m ³) if approved	30 -	50
Steel Fibre (kg/m³) if approved	30	40

Water/cement ratio is defined as the mass of the free water in the mix divided by the total mass of cementitious material in the mix.

Where the use of an accelerating admixture is required, the amount used shall be within limits recommended by the manufacturer but shall not exceed 4% by mass of total cementitious content unless the Contractor can satisfy the Engineer that the 5 year strength is not detrimentally affected. In the case of cement containing Fly Ash, the advice of the manufacturer of the additive (and of the cement if necessary) shall be obtained before the Engineer will approve the use of the accelerating admixture. Minimum admixture should be used to obtain the specified early strength appropriate to the conditions.

In addition, the Engineer reserves the right at any time during the progress of the work to instruct the Contractor to vary the proportions of the constituents of the shotcrete mix or order further trial applications to ensure that adequate densities and high early strengths are maintained.

Acceptance testing of shotcrete shall be performed as specified in Clause CWD8.10.4.

TABLE 8/3: SHOTCRETE PERFORMANCE REQUIREMENTS

Shotcrete Class		Α	В	С	D
Mix Description	Test Method	Plain	Steel Fibre reinforcement	Steel Fibre Reinforcement & Accelerator	Plain & Accelerator
Cube Strength	ASTM	_			_
MPa at 8hrs	42	N/A	N/A	5	5
MPa at 24 hours		N/A	N/A	9	9
MPa at 28 days	(BS 1881)	35	40	40	40
Peak Flexural Strength	ASTM				
MPa at 28days	C1018	3.5	4.0	4.0	4.0
Residual Flexural Strength	ASTM	N/A	3.2	3.2	N/A
MPa at 28 days	C1018				
Toughness indices	ASTM				
1 ₂₀ at 28 days	C1018	N/A	16	16	N/A
1 ₃₀ at 28 days		N/A	22	22	N/A
1 ₅₀ at 28 days		N/A	30	30	N/A
Boiled absorption %	ASTM	8	8	9	9
Volume of Permeable	C6642				
Voids, % at 7 days		17	17	19	19
Setting time:	ASTM				
Initial Set, min.	C403	N/A	N/A	3	3
Final Set, min.	BSEN 196-	N/A	N/A	9	9

Notes:

- The above values are all "minimum" acceptable limits, except for boiled absorption and volume of permeable voids, which are "maximum" acceptable limits.
- 2) N/A indicates "not applicable".

CWD08.9.4. Equipment

All the equipment used for batching and mixing of materials and the application of shotcrete shall be off approved design and in proper working order. The shotcrete gun and ancillary equipment shall be of adequate capacity for the volumes to be applied. The equipment shall be capable of handling and applying 13 mm maximum size of aggregate. A stand-by gun and ancillary equipment shall be available at all times. Air for the equipment is to be provided to the equipment at not less than the operating pressure specified by the manufacturer.

Dosing of additives by hand will not be permitted. Equipment for dosing additives shall be adjustable for various quantities and provide a uniform rate of discharge evenly mixed with the other ingredients of the mix. the equipment shall be capable of delivering admixture to ensure the approved dosage ratio to an accuracy of

±5%.

If at any time the Engineer considers that the environmental conditions of the area where shotcrete is being applied are likely to cause a health hazard or affect the quality of the finished work because of excessive dust or lack of adequate ventilation or lighting, he may order the Contractor to suspend operations on shotcrete work until steps are taken to improve the conditions in the affected area. No additional payment will be made either for the additional measures called for or for any delays resulting from such suspension of works.

CWD08.9.5. **Batching**

Materials shall be batched by mass and cement shall not be added more than 1 hour before the anticipated time of placing the shotcrete unless the use of a retarder has been approved by the Engineer. Mixed ingredients shall be placed before the initial set of the cement has taken place. Aged material shall be discarded.

Feed systems for all materials are to be interconnected such that the correct proportions are maintained irrespective of feed rate and if one feed stops, the whole plant stops.

Batching and mixing equipment shall be cleaned at least once per shift to prevent accumulations of aged material.

CWD08.9.6. **Preparation of Surfaces**

Before shotcrete is applied, checking and correction of the excavated cross-section profile shall be carried out. The surfaces to which shotcrete is to be applied are to be barred down of all large loose material and the area cleaned down of all loose and foreign material with a mixture of water and air applied at high pressure.

Where the inflow of groundwater renders the surface too wet for the normal application of shotcrete, the surface shall be treated as required.

All surfaces to receive shotcrete shall be moist and free of all traces of dirt, oil, rebound or other deleterious material.

Where shotcrete is to be placed over a previous layer, that layer shall be first allowed to reach its initial set and then cleaned of all rebound or other loose material to the approval of the Engineer.

Shotcrete shall not be applied to any surface without the prior inspection and approval of the Engineer.

CWD08.9.7. Placing

Shotcrete shall be placed in accordance with good practice as detailed in AC1 -506R-85 Guide to Shotcrete except that with silica fume shotcrete it is usually possible to build up relatively thick layers in a single pass.

No shotcrete shall be placed in air temperatures less than 1 "C. Where necessary freshly placed shotcrete shall be protected from rain or water until the surface is of sufficient hardness to prevent damage.

There shall be no inclusion of rebound in the finished work, no hollow areas, or other conditions that may prevent good adherence to the rock and a reasonably smooth surface finish. Rebound shall be kept clear of shotcrete being placed.

The minimum specified layer thickness shall be controlled by depth pins attached to the rock surface and reinforcement, or other approved means.

Before a succeeding layer is placed the existing work shall be checked for hollow or non-adhering areas and these shall be cut out and replaced to the satisfaction of the Engineer.

Construction joints in the layer shall be formed at 45° to the face and precautions shall be taken to prevent weak and unsightly edges at construction joints. If necessary, timber strips may be temporarily fixed in place to give a neat, strong edge. Before placing the adjoining work the edge shall be cleaned and thoroughly wetted.

CWD08.9.8. Curing

The use of a shotcrete curing compound will not be permitted. The shotcrete shall be kept moist continuously for three days by spraying with a fine mist of water at intervals not exceeding four hours.

CWD08,9.9. Operators for Shotcreting

Only trained and tested operators shall be used for shotcreting operations. The Contractor shall satisfy the Engineer that the personnel are capable of doing work of a high standard prior to any shotcrete work being undertaken in the Works. For this purpose each nozzle man and back-up team shall carry out a series of trial applications in the presence of the Engineer to demonstrate their ability in applying shotcrete on vertical and overhead surfaces. Test panels as described in Clause CWD08.1 0.4.3 shall be made by each operator. No operator will be approved unless the 28 day crushing strengths of all tests exceed the design requirements.

The Engineer may at any time withdraw his approval of personnel if the quality of shotcrete applied falls below the specified standard.

CWD08.9.10. Drainage Holes

Where required drainage holes shall be provided in accordance with the provisions of Section 4 - Dealing with Water. Where shotcrete is applied after completion of the drainage holes the drainage holes shall be extended through the shotcrete with suitable formers or similar approved method.

CWD08.9.11. Pressure Relief Holes

Generally one day after shotcrete, pressure relief holes of 38 mm diameter shall be drilled through the shotcrete and 450 mm minimum into the rock as shown on the Drawings or as directed by the Engineer. In general a spacing of 1 hole per 4 m2 shall be provided in areas where a build-up of water pressure could be expected.

CWD08.9.12. Checking of Applied Thickness

The thickness of applied shotcrete shall be checked by the Contractor by means of an agreed grid of test holes. An acceptable procedure for these test holes shall be such that on average in any 100 m2 area of shotcrete area at least two test holes shall be drilled with a percussion drill where directed by the Engineer.

The Contractor may drill additional holes if he wishes at points intermediate to those located by the Engineer.

The basis of acceptance shall be that in any area of 100 m2 the arithmetic mean thickness of all the points checked shall be equal to or greater than the specified thickness. In addition at no point checked shall the thickness be less than 70% of the specified thickness for layers less than 100 mm specified thickness or 50% for layers of 100 mm specified thickness or more. Where the thickness is not acceptable, the Engineer may order an additional layer of shotcrete to be applied and rechecked for thickness without additional payment until the placed thickness is acceptable.

CWD08.10. TESTING

CWD08,10.1. Grout

The bleeding of the grout shall be tested by placing a sample of the grout in a covered graduated cylinder of 100mm diameter and fitted with a thermometer. The height of the grout in the cylinder shall be 100mm. The temperature of the grout shall be kept at 20"±2"C and bleeding shall be checked for compliance with Clause CWD08.5.4 of this specification.

The mixed grout shall be sampled in accordance with SANS 5862 and cured and tested in accordance with SANS 5863 for compliance with Clause CWD08.5.4 of this specification

CWD08.10.2. Testing of Dowels and Geo-nails

CWD08.10.2.1. Dowel and Geo-nail Capacity Testing

Prior to the installation of dowels and geo-nails in the Works the Contractor shall carry out a series of tests as agreed with the Engineer to prove the capacity of the system and the Contractor's capability to correctly install the dowels and geo-nails.

The tests shall demonstrate:

- (a) The strength of the grout to fully anchor the bars up to the characteristic strength of the dowels and geonails.
- (b) The capacity of the equipment to install the longest fully grouted dowels and geo-nails
- (c) The capacity of each crew to correctly install the dowels and geo-nails as specified.

The Contractor shall undertake the tests with the equipment to be used on the Works and shall install test dowels and geo-nails.

The Contractor shall provide a suitably calibrated direct tensioning jack and/or load cell of capacity in excess of the characteristic strength of the dowels and geo-nails. Loads and dowel and geo-nail elongations shall be recorded during the tests.

CWD08.10.2.2. Routine Dowel Quality Testing

Routine quality control testing of dowels installed in the works, as follows:

- (a) The Contractor shall carry out in-situ tests on dowels installed in the works as agreed with the Engineer. Testing is to be generally in accordance with the procedures given in the ISRM Suggested Methods for Rock bolt Testing (1974) or BS 8081 (1989) as directed by the Engineer.
- (b) The Contractor shall check the effectiveness of dowel installation procedures by testing a minimum of 1in 100 units installed as directed by the Engineer, to a test load of 70% of the bar's specified characteristic strength. Dowels shall be tested after the grout has achieved its design strength.
- (c) Any dowel that fails at a tension of less than or equal to 70% of its specified characteristic strength shall be replaced. Also, in such event, for the last 100 dowel units installed, such support will be considered partly un bonded from the rock and additional dowels shall be installed over the affected length of the excavation with the diameter, length and spacing of such additional support to be as specified by the Engineer. The Contractor shall install such additional support before advancing the excavation any further. No additional payment will be made for installation of such additional support or for any resultant delays to the works.
- (d) The Contractor shall furthermore investigate the cause of such failure and make such proposals for amendment of the installation procedure as may be necessary. Tests shall continue thereafter at a rate of 1 in 50 to 1 in 20 units installed as directed by the Engineer, until the Engineer is satisfied that the cause of the failure has been overcome.
- (e) The Contractor, in the presence of the Engineer, shall carry out regular calibration of hydraulic tensioning devices. The Contractor shall provide the necessary testing equipment as required with recalibration certificates when requested by the Engineer.

CWD08.10.3. Testing of Rock bolts

CWD08.10.3.1. Rock bolt Capacity Testing

Prior to the installation of rock bolts in the Works the Contractor shall carry out a series of tests as agreed with the Engineer to prove the capacity of the system and the Contractor's capability to correctly install and tension the rock bolts. The tests shall demonstrate:

- (a) The volume of cement grout or number of resin cartridges required to provide the end anchorage with an applied load equal to the bar's characteristic strength and taking into account the over-length variation of holes.
- (b) The grout volume to fill the annulus around the rock bolt over the length of the hole between the anchorage and collar of the hole.
- (c) The strength of the cement or resin grout to fully anchor the bars up to the characteristic strength of the rock bolts.
- (d) The capacity of the equipment to install the longest fully grouted rock bolts.
- (e) The equipment for tensioning the bolts to the specified loads.
- (f) The capability of each crew to correctly install and tension the rock bolts

The Contractor shall undertake the tests with the equipment to be used on the Works and shall install the test bolts in a suitable rock face in a steeply inclined upward direction.

The Contractor shall provide a suitably calibrated direct tensioning jack and/or load cell of capacities in excess of the characteristic strength of the rock bolts. Loads and bolt elongations shall be recorded during the tests.

CWD08.10.3.2. Routine Rock bolt Quality Testing

The effectiveness of the installation procedure shall be checked by testing the residual load in a minimum of 1 bolt out of 200 bolts installed or as ordered by the Engineer. The rock bolt shall be tensioned to 120% of the required load and the extension of the bolt recorded. The load shall be held for a period of 5 minutes and the load and extension readings recorded. The installation shall be acceptable if no load reduction and no continued extension are recorded.

Should the rock bolt fail this test, the Contractor shall investigate the cause and make appropriate proposals for amendment of the installation procedure as may be necessary. Tests shall continue thereafter at a rate of 1 bolt in 50 bolts until the Engineer is satisfied that the cause of the failure has been overcome.

Failed rock bolts shall be replaced by the Contractor at his own cost.

CWD08.10.4. Testing of Shotcrete

CWD08.10.4.1. General

For acceptance and routine testing, 100 mm diameter cores of a length between 110 mm and 150 mm after the ends are cut and trimmed shall be drilled from test panels by the Contractor. The remainder of the test panel shall be broken up to provide samples for density testing.

The panels shall be field cured in the same manner as the work, after which the Contractor shall deliver the panels to the laboratory where the panels shall be cured in water as specified in BS 1881.

Three cores shall be cut and tested for compressive strength at 3 days or 7 days and 28 days as directed by and in the presence of the Engineer. The compressive strengths shall be corrected to the equivalent cube strength as set out in BS 1881.

In places where the thickness of the shotcrete layers are such that it will be possible to cut out 100 mm test cores, the Engineer may specify that such cores be cut out for testing. An average of not more than 2 x 100 mm cores shall be required for every 100 m2•

Three samples each shall be tested at 7 days for volume of permeable voids and boiled absorption (density tests)

For the purpose of sampling and testing shotcrete the Contractor shall supply all the panel moulds and core sampling equipment. The concrete testing machine supplied by the Contractor for testing concrete cubes shall also be suitable for testing shotcrete samples.

CWD08.10.4.2. Shotcrete Acceptance Testing

Prior to commencement of shotcrete in the Works testing shall be carried out by the Contractor as follows:

(a) Test panels as specified in Clause 8. 10.4.1 shall be constructed in the presence of the Engineer for each mix designed.

Cores shall be cut from the panels and 3 cores tested at each specified strength requirement.

The average of the 3 results tested at 24 hours and 28 days shall be not less than the 24 hours and 28 day specified strengths respectively. In addition, the value of each core tested shall be within 20% of the average value.

- (b) Sufficient tests to prove the acceptability of the shotcrete to meet the requirements with regard to:
 - i) Boiled absorption;
 - ii) Volume of permeable voids;
 - iii) Setting time;
 - iv) First crack and ultimate tensile strength; and
 - v) Toughness index.

CWD08.10.4.3. Shotcrete Routine Testing

On average, one test panel shall be made and tested by the Contractor on each shift when shotcrete is applied in each surface location. Such test panels shall be prepared by the nozzle man doing the work during normal shotcreting operations.

The test panels are to be made by spraying into moulds 750 mm x 450 mm x 200 mm deep with sides splayed outwards at 45 ° to prevent the entrapment of rebound. Panels shall be placed against the sidewall. Panels shall be clearly marked to identify the time and date of spraying and the area where they were sprayed.

Subject to satisfactory test results the testing frequency may be reduced at the discretion of the Engineer.

CWD08.10.4.4. Failure of Shotcrete

For the purposes of routine testing the quality of the shotcrete will be considered satisfactory if every test result is at least 80% of the specified result and if at least 80% of all results exceed the specified result.

Should test samples of shotcrete not achieve the specified minimum result, the Engineer will if necessary order that additional tests be carried out by the Contractor to determine new mix proportions and/or application methods to avoid further such failures.

If the Engineer considers that the low test results of the applied shotcrete may reduce the safety of the Works and persons or be detrimental to the effectiveness of the support, he may order that the following action be taken:

- i) Remove the defective shotcrete in strips or panels in such a way that the safety of the Works and persons is not endangered and replace with shotcrete that is acceptable, which may also require the replacement of the mesh, or
- ii) Apply additional thickness of shotcrete not exceeding the thickness originally required.

In either case no payment will be made for the defective shotcrete already applied, nor for the work involved in removing it from the areas where it has been applied, nor for any mesh that must be replaced, including additional laps, nor for any work involved in removing the resultant rubble from Site and spoiling it in an approved spoil dump. Payment will only be made for that shotcrete placed as specified.

CWD08.11. MEASUREMENT AND PAYMENT

CWD08.11.1. Basic Principles

Measurement and payment for rock support shall basically be made for the number of units of each type of rock support satisfactorily installed. Additional measurement and payment shall be made for the lengths of rock dowels, geo-nails and rock-bolts installed, as well as for checking tension and/or re-tensioning rock-bolts.

The Contractor shall at his own expense conduct the capacity tests on dowels, geo-nails and rock bolts, approved by the Engineer, on the quality of the materials and methods employed and the accuracy of all instruments used.

The costs of performing full-scale tests to destruction of such rock-bolt and assemblies as the Engineer may order from time to time shall be borne by the Contractor, but the number of rock-bolts so destroyed shall be measured for payment in accordance with the appropriate items to cover the costs of the rock bolts destroyed.

Where rock-bolts fail at loads less than the specified characteristic strength and the cause of such failure is not due to poor ground or rock conditions, the Contractor shall at his own expense replace, repair or make good such defective units and such other defective units of which the test may be representative. Where defective units are encountered, the Contractor shall at his own cost conduct such regular tests, including tests to destruction as the Engineer may order.

The Contractor shall ensure that each tendon will be anchored in rock capable of resisting the required loads and any fixed anchorage that is damaged or that cannot transmit the required load due to slipping of the fixed anchorage shall be made good by the Contractor at his own expense and to the approval of the Engineer, if such poor rock condition had not previously been reported to the Engineer.

The cost of any remedial and corrective measures (including the relaxing and the re-tensioning of rock bolts) that have been necessitated by failure of one or more rock-bolts to comply with the requirements of this specification shall be borne by the Contractor.

All rock bolts that have become loosened or have lost tension as a result of blasting vibrations shall immediately be restressed by the Contractor. All rock bolts, dowels or geo-nails damaged by blasting shall be repaired or replaced by the Contractor on his own expense to the satisfaction of the Engineer. If, due to the proximity of the rock bolts or geo-nails, ordered by the Engineer, to the excavation face, the Engineer is of the opinion that loosening of the rock bolts or geo-nails could not have been avoided, due regard being taken of all relevant factors such as charge levels, detonation sequence and size of round, the Contractor shall be paid for restressing, repairing or replacing such damaged rock bolts or geo-nails. Payment shall be made only in accordance with the relevant specified items. Payment shall generally only be made for those rock bolts and geo-nails where the charge level could not, in the opinion of the Engineer, be limited to a value sufficiently low to prevent damage.

If any rock bolt, dowel or geo-nail becomes damaged in any way due to construction operations, the Contractor shall repair or replace the affected item(s) at his own expense to the approval of the Engineer.

CWD08.11.2. Scheduled Items

CWD08.11.2.1. Rock Dowels

a) Rock Dowels supplied and installed

The unit of measurement for supplying and installing rock dowels shall be the number of rock dowels satisfactorily installed complete, irrespective of the length. The payment shall include for the supplying of all

Unit: No

materials, including the dowel, corrosion protection if required, setting up equipment, installing, cutting and bending, supporting in position until such time as the bond between the bar and the grout cannot be damaged and all capacity and routine quality testing.

b) Extra-over for rock dowel length

Unit: m

An additional extra over measurement for payment shall be made for the length of rock dowel supplied and installed, which unit of measurement shall be the linear metre of rock dowel, based on the length of steel bar measured between the ends of the rock dowel. The payment shall be deemed to be inclusive of all drilling, checking the alignment and depth of holes (including remedial measures if required), cleaning of holes and grouting.

CWD08.11.2.2. Geo-nails

a) Geo-nails supplied and installed

Unit: No

The unit of measurement for supplying and installing geo-nails shall be the number of geo-nails satisfactorily installed complete, irrespective of the length. The payment shall include for the supplying, all materials, including the geo-nail with face plate, washer and nut, corrosion protection if required, setting up equipment, installing, cutting and supporting in position until such time as the bond between the bar and the grout cannot be damaged, attaching the face plate, washer and nut and tightening the nut and all capacity and routine quality testing.

b) Extra-over for geo-nail length

An additional extra over measurement for payment shall be made for the length of geo-nail supplied and installed, which unit of measurement shall be the linear metre of geo-nail, based on the length of steel bar measured between the ends of the geo-nail. The payment shall be deemed to be inclusive of all drilling, checking the alignment and depth of holes (including remedial measures if required), cleaning of holes and grouting.

CWD08.11.2.3. Rock bolts

a) Rock bolts supplied and installed

Unit: No

The unit of measurement for supplying and installing rock bolts shall be the number of rock bolts satisfactorily installed complete, irrespective of the length. The payment shall include for the supplying, installing, tensioning and protecting the other end with concrete and all capacity and routine quality testing.

b) Extra-over for rock bolt length

Unit: m

An additional extra-over measurement for payment shall be made for the length of rock bolt supplied and installed, which unit of measurement shall be the linear metre of rock bolt, based on the lengths as shown on the Drawings and ordered by the Engineer. The payment shall be deemed to be inclusive of all drilling, checking the alignment and the depth of holes (including remedial measures if required) and grouting.

c) Checking tension and/or re-tensioning

Unit: No

The unit of measurement for checking the tension and/or re-tensioning rock bolts shall be the number of rock bolts checked and/or re-tensioned, The payment shall include for setting up, checking the tension, re-tensioning if required and reporting the results to the Engineer on site.

CWD08.11.2.4. Mesh Reinforcement

Unit: m2

Measurement for mesh reinforcement will be the net area, with no allowance for laps, of mesh fixed to the excavated surface based on an area measured on the theoretical excavation cross-section profile given on the drawings. The rate tendered shall include full compensation for the supply and installation including all holding down pins, spacers and spiders.

CWD08.11.2.5. Shotcrete

Unit: m2

Measurement of shotcrete will be the net area measured on the theoretical cross-section profile given on the Drawings at the specified thickness.

The rates tendered for application of shotcrete for various thicknesses specified shall include for all work required for the preparation of surfaces and application of shotcrete, all materials, cleaning and disposal of rebound, thickness control measures, drilling of holes for checking thickness, providing drainage holes, all design and routine testing. Where ordered by the Engineer that the full specified layer be built up in separate layers, payment shall be made at the rates tendered for the separate individual layers.

CWD08.11.2.6. Pressure Relief Holes

Measurement will be the number of pressure relief holes drilled as specified.

The rate tendered shall include full compensation for all operations required to drill a 38mm diameter hole through sprayed concrete and 450mm into rock.

CWD08.11.2.7. Double Twisted Wire Mesh

Unit: m2

Unit: No

Measurement for double twisted wire mesh shall be the net area, with no allowance for laps, of wire mesh fixed to excavated surface including all labour, plant and fixing equipment.

The tendered rate shall include full compensation for the supply and installation including holding down pins or other fixing fittings.

PARTICULAR SPECIFICATION CWD09 BLASTING

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PARTICULAR SPECIFICATION CWD09 BLASTING

CWD09.1 SCOPE

This section deals with the requirements for blasting methods to be used for excavation.

CWD09.2 INTERPRETATIONS

CWD09.2.1 SUPPORTING SPECIFICATIONS AND STANDARDS

This specification is supported by the specifications and standards referred to or contained elsewhere in this document.

CWD09.2.2 DEFINITIONS AND ABBREVIATIONS

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

<u>Bulk blasting</u> comprises the drilling of vertical holes at a predefined burden and spacing grid to a specific depth, charging the holes with an appropriate amount and type of explosive to break the rock in suitable sizes for excavation by machinery.

<u>Payment line</u> is the excavation profile given on the Drawings or determined by the Engineer for the Permanent Works and to which payment for excavation will be made.

<u>Pre-splitting</u> comprises drilling a line of closely spaced parallel holes of appropriate diameter, spaced not more than ten times the hole diameter or 600mm, whichever is the smaller and charging the holes with an appropriate amount (decoupled if necessary) and type of explosive to shear the rock, forming a surface along the line of drill holes.

Either all the holes in a pre-split line shall be drilled, charged and detonated simultaneously prior to drilling the production holes for the excavation adjacent to the pre-split line, or pre-splitting shall be accomplished by delay detonation in the production holes to allow pre-split holes to fire first. The first line of production holes next to the pre-split face shall be lightly charged to ensure that the pre-split face is not damaged when the charges in the production holes are detonated.

<u>Smooth Blasting</u> comprises the drilling of a number of closely spaced parallel holes along the required excavation surface, with a suitable burden/spacing ratio, loading all the holes lightly with a uniform continuous charge of small diameter explosive and detonating all these charges simultaneously, after the detonation of the main production blast.

<u>Line Drilling</u> comprises drilling a line of holes of appropriate diameter spaced not more than twice the hole diameter to form a surface of weakness along which the rock will break. Blasting is not permitted in the line drilled holes, and the first line of production holes next to the line drilled holes shall be lightly charged to avoid damage to the line drilled break surface.

<u>Trim Blasting</u> comprises the separate removal of a protective zone of rock which has been purposely left within the specified limits of excavation for flat areas and shallow slopes. Drilling for trim blasting shall consist of a regular pattern of holes at appropriate spacing and angles and to accurate depths.

The holes shall be lightly charged and detonated in relays to lift the rock progressively to form the final excavated surface without shattering the surrounding rock.

Overbreak_means any excavation which extends beyond the payment line, irrespective of the reason for such excavation.

CWD09.3 REGULATIONS

The storage of explosives, use of explosives, personnel, transport of explosives, and other matters related to explosives shall be governed by the relevant sections of the Explosives Act (Act 26 of 1956, as amended), Minerals Act (Act 50 of 1991) and the Labour Act 1992.

No explosives of any kind shall be used without the prior approval in writing of the Engineer.

Once this approval is granted, the Contractor shall be solely responsible for proper storage, transport, importation, security arrangements during transport to the Contractor's storage magazine(s) at Site and the correct possession and use of explosives.

The Contractor shall keep records in respect of receipt, storage and use of explosives. The Engineer shall have the right to inspect explosives magazines and records kept therein in respect of the storage, receipt and issue of explosives.

The Contractor shall display in his Site office, and all his explosives magazines, a copy of any applicable Statutory Regulations, and the applicable section of the approved Health and Safety policy and shall supply a copy to the Engineer.

A copy of all the permits issued, by the authorities, to workmen to permit them to undertake blasting, and to the Contractor to cover the purchasing, storage and transport of explosives shall be handed to the Engineer before any blasting work is undertaken.

CWD09.4 SAFETY PRECAUTIONS

The Contractor shall in accordance with all the statutory requirements agree with the Engineer 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 store, transport, possess and use explosives in accordance the relevant sections of the Acts referred to in Clause CWD09.3.

Furthermore, the Contractor shall take particular precautions with respect to lightning, such as the use of non-electric detonators or electric detonators specially manufactured for use in such circumstances coupled with the use of lightning warning equipment.

The Contractor shall install and operate a siren of sufficient volume to be easily heard above the general site noise from all points within a radius of 1km of surface blasts. Hand operated sirens will not be permitted. In addition to the above, the Contractor shall station men on roads and elsewhere with red flags to prevent persons, animals and traffic entering or remaining within the danger zone.

Care shall be taken to ensure that all possible approach routes to the danger zone are covered by these warning arrangements. Blasting shall not be carried out until occupants of any nearby buildings or working areas have been notified by the Contractor at least 24 hours in advance.

After blasting, no person shall approach the area until it has been examined by the blasting supervisor or other responsible person and declared safe.

CWD09.5 GENERAL

The Contractor shall take due cognizance of all existing buildings and other structures in the area surrounding the blasting operations. He shall at all times ensure that his blasts are designed so as not to cause damaging ground vibrations and air blasts. The Contractor will be held responsible for any damage caused by any of his blasting operations, and shall at his own expense, make good such damage. All alleged claims due to blasting from local communities will be directed to the Contractor for his attention. The Contractor will be responsible for resolving all claims.

Prior to the commencement of the blasting operations, the Contractor shall prepare a photographic record of each structure, especially houses, buildings, ruins, etc., of the local communities within 150m of an) Works, prior to any blasting taking place. A copy of this report shall immediately be given to the Engineer..

The Contractor shall submit to the Engineer at least 28 days before the commencement of any excavation work full details of his proposed methods and sequence of excavation and programme for the use of explosives.

Within 2 weeks of receipt of the proposals, the Engineer shall indicate approval in part or in whole, in writing, to the Contractor. The Engineer reserves the right to reject the proposals if, in his opinion, undesirable damage to permanent rock surfaces or existing structures will result from carrying out the blasting as proposed. If approval is withheld, new proposals in whole or in part shall be submitted. No drilling or blasting shall be carried out in areas for which the proposals have not been approved by the Engineer, and any changes to the accepted methods shall be subject to the Engineer's approval.

The work shall be programmed so as to minimise blasting adjacent to previously constructed sections of the Works.

Where blasting is necessary every precaution including the use of blast mats, timber boarding or other means shall be exercised to protect the Works and persons,' animals and property in the vicinity of the Site. The Contractor shall accept responsibility for all injury or damage occasioned by any blasting operations and shall make good such damage without any additional payment.

The Contractor shall, in particular, note the requirement that he must limit to the maximum extent practicable the spillage of material from surface excavations, whether by blasting or other means, down the adjacent hillside. To this end the Contractor shall take all necessary precautions including, if necessary, covering the rock prior to blasting with sufficient loose material to prevent the blasted material being thrown down the adjacent hillside. If, however, during the course of excavation on a hillside, the Engineer is of the opinion that insufficient precautions are being taken to minimise the spillage of material, he may instruct the Contractor to adopt further measures to reduce the spillage. No separate payment will be made for any such measures required.

Each separate blast shall be designed in accordance with modern blasting practice to break out the rock with the minimum explosive force. Full details of each blast shall be submitted to the Engineer for scrutiny not later than 24 hours prior to the commencement of drilling for that blast. The details shall include the location, depth and area of blast boles, the type, strength, amount, column load and distribution of explosives to be used per hole, per delay and per blast, the sequence and pattern of delays, the maximum expected level of shockwaves on adjacent structures, and the description and purpose of any special methods to be adopted by the Contractor.

The approval by the Engineer to any blasting proposals shall not relieve the Contractor of his responsibilities under the Contract and the Law.

Should the Contractor excavate to dimensions in excess of those specified or instructed by the Engineer, whether to remove damaged material or for reasons of safety or for his own convenience, he shall at his own expense and when required by the Engineer, fill in the excess excavation with concrete of approved quality or with other material approved by the Engineer, or carry out additional trimming to the satisfaction of the Engineer.

The Contractor shall provide the Engineer each day with a copy of -the record for the previous day's excavations. Where applicable the following data shall be recorded for each working area together with such other data as the Engineer may request:

- a) Location of the excavation and position within the excavation;
- b) Drilling pattern;
- c) Type and amount of explosive used, including blasting pattern and delays used;
- d) Details of rock support;
- e) Surface area of shotcrete and location;
- f) Number and classification of labour and plant;
- g) Unusual occurrences, rock falls, unstable or soft ground and inflows of water;
- h) Progress, delays and reasons for delays; and
- i) Name of blaster.

CWD09.6 QUALITY OF EXCAVATED SURFACE AND BLASTING TRIALS

Unless otherwise detailed on the Drawings or instructed by the Engineer all blasting work shall be carried out using controlled blasting techniques to minimise any damage to the final profile.

Use shall be made of approved special explosives and/or biasting techniques which will minimise blasting induced fractures, or disturbance, on the rock faces outside the excavation line so preserving the rock in the soundest possible condition.

The surface after blasting shall exhibit a regular fracture plane between barrels without back break and with half barrels visible over the major portion of the surface. The surface shall be scaled down of all loose and hollow sounding rock to leave a solid, intact surface. Light charges shall be used for enlarging or correcting the excavated profile and also for excavating trenches.

The Contractor shall incorporate a series of blasting trials in his initial blasting operations to substantiate his proposed methods of blasting. Details of all proposed blasting trials and procedures shall be submitted to the Engineer for scrutiny in me normal manner.

A sufficient number of trials in each of the main rock types shall be carried out to substantiate that the depth and spacing of holes, the type and amount of explosive used per hole and the number and sequence of delays has been optimised in order to avoid as far as practicable fracturing or otherwise damaging the ground below or beyond the excavation line or level. The minimum depth and length of each trial section shall be 5 and 10 m respectively or as otherwise directed by the Engineer. The site for the trials shall be agreed with the Engineer.

Once the results of the trials are approved, such results shall form the basis of whether future controlled blasting is achieving the required standard.

If in the opinion of the Engineer, the methods of blasting are at any time causing excessive or undesirable disturbance of the rock mass surrounding the excavated space, he may order the Contractor to change his methods of blasting and/or carry out further blasting trials until the desired results are achieved. No additional payment shall be made for any change or further trials ordered by the Engineer or any delays resulting therefrom.

If the excavated rock is to be used as rockfill or riprap, or concrete aggregate, the Contractor shall select his blasting method such that the blasted material is fractured to sizes suitable for the purpose. Secondary blasting is to be avoided.

CWD09.7 MONITORING OF BLASTS

The Contractor shall supply and operate an approved tri-axial particle velocity meter equipped with a permanent paper trace output, which shall be used as and where directed by the Engineer to monitor blasting work.

The paper trace output records shall show the time and location of each blast, the type and amount of explosive used, together with any other relevant data. Copies of these records shall accompany the daily records required in terms of Clause 7.5.

CWD09.8 NOTIFICATION OF BLASTS

The Contractor shall notify the Engineer of the intention to blast at least 24 hours before that operation is carried out. The notification shall show the location of and the intended time of each blast, and the name of the licensed blaster and shift foreman responsible.

The Contractor shall distribute written notification to all organisations on Site 24 hours prior to undertaking surface blasting. Any delay or postponement of any blasts shall be notified to all organisations immediately. The firing of explosives shall be restricted to between 06:00 and 18:00 daily with the exception of Sundays when no blasting shall be permitted unless authorised by the Engineer.

The Contractor shall notify the adjacent communities of any blasting activities in accordance with the relevant legislation.

CWD09.9 BLASTING NEAR STRUCTURES

Contractor shall be responsible for avoiding damage to adjacent structures from fly rock by erecting barricades and/or the use of blast mats or other means acceptable to the Engineer. Should any damage be caused by his operations this shall be made good without any additional payment. The contractor shall exercise special care to avoid damage to concrete, shotcrete or grouting already completed.

Blasting to be carried out within 100 m of any concrete and/or grouting regardless of age, shall be done by means of Gas-Induced Fracture Technology (GIFT) using Nonex, or by means of controlled blasting techniques, to the approval of the Design Engineer. All such blasting shall be designed to keep peak particle velocities (PPV) to below 12,7 mm/s and the frequency above 10 Hz

The unrestricted use of explosives will not be permitted in any part of the Works. The amount of explosives that may be detonated shall not result in a ground vibration with a peak particle velocity exceeding the values in relation to the corresponding frequencies as given in Table 7.9 below, at the nearest point of any part of the Permanent Works to the blasting site. Where circumstances dictate, such as when blasting near to partially cured concrete, the peak particle velocity permitted may be reduced by the Engineer.

Table 7.9. Maximum Peak Particle Velocity vs. Frequency

Frequency (Hertz)	Peak Particle Velocity (mm/s)
1 to 4	5 to 19
>4,<15	20
>15,<50	21 to 51

Blasting shall not be carried out within 10 m of the Permanent Works, unless otherwise agreed to in writing by the Engineer.

CWD09.10 DISPOSAL OF EXPLOSIVES

Should the Contractor be granted permission by the relevant Statutory Authority to retain outdated explosives in a site magazine or storage place he shall immediately inform the Engineer and if requested to do so, furnish the Engineer with a copy of such authorisation. When any explosives are to be destroyed, the Engineer shall be informed at least 24 hours before the destruction is due to take place. Under no circumstances may explosives be destroyed in or near the Permanent Works.

CWD09.11 BLASTING

CWD09.11.1 GENERAL

Controlled blasting methods shall comprise of:

- Perimeter blasting techniques such as pre-splitting, smooth blasting, and line drilling
- Trim Blasting is the removal of rock purposely left within specified limits of flat area excavation
- Bulk blasting with bench heights in foundation excavations shall not exceed 2m.

All charges shall be accurately made up and inserted into the holes at the correct spacing, and all holes shall be correctly stemmed and connected in the correct sequence, with detonators being correctly delayed.

If at any time the methods of drilling and blasting do not produce the desired results of a uniform profile and shear face without over break, all within the tolerances specified, the Contractor shall be required to undertake further tests as specified in CWD09.7 until a technique is arrived at that will produce the desired results.

Controlled blasting shall be used on the perimeter of all excavations in rock for the Permanent Works, designated excavations and otherwise where called for by the Engineer.

CWD09.11.2 DRILLING

In all controlled blasting, drilling accuracy of perimeter holes is of prime importance and the Contractor shall take particular care and make use of sight lines and guide rails in surface work to control the alignment and depth of blast holes. Holes which are likely to protrude more than 100mm beyond the excavation profile (including any tolerances specified) shall not be charged up, but shall be re-drilled.

The blast pattern shall be accurately set out and holes shall be collared within 50 mm of the required position. Holes which are over drilled shall be fully stemmed to the required depth before charging up takes place.

The length of perimeter holes for any individual lift shall not exceed the bench height or any lesser depth detailed on the Drawings unless the Contractor can demonstrate to the Engineer that he can stay within the required tolerances, produce a uniform surface, and provide suitable access for all the subsequent necessary scaling, inspection, mapping and installation of the required rock reinforcement and support.

CWD09.11.3 USE OF EXPLOSIVES

Both cartridge and bulk explosives may be used where appropriate. In controlled blasting the type, size, decoupling and charge concentration of perimeter and bulk charges shall be within established parameters unless otherwise proven acceptable by site trials.

The bottom charge of a pre-split hole shall not be larger than the line charges unless otherwise directed. The top charge of the pre-splitting hole shall be placed far enough below the collar to avoid over breaking the final profile.

Adequate stemming shall be used to avoid blow-outs.

CWD09.12 CHECKING AND CORRECTION OF THE EXCAVATED PROFILE

The excavated profile shall be checked for line, level and under break using methods approved by the Engineer. No projections of rock shall protrude within the payment line, except as allowed within the specified tolerances.

The Contractor shall submit his proposals for removing any under break to the Engineer for his approval prior to carrying out any such work of removal. Any work executed or delays, which are due to the Contractor having to re-excavate under break and then re-install support shall be carried out without additional payment, and no extension of time will be allowed for this work

Except as otherwise specified or instructed by the Engineer 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.

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.

CWD09.13 MEASUREMENT AND PAYMENT

CWD09.13.1 BASIC PRINCIPALS

The rate tender under this section shall not include the general obligations and work deemed to be covered under Preliminary and General Items. Blasting will be measured separately for specific activities.

 M^2

UNIT:

It will be measured for payment in designated excavations or as ordered by the Engineer for the Permanent Works.

The rate shall deemed to include for blasting trials, any additional work for setting-up drilling equipment, any additional setting out and control measures, limited spacing and diameter of perimeter holes, any additional uncharged holes, the acquisition, transport, storage and the use of explosives, the handling and charge of explosives and stemming of holes.

The rate shall deemed to include for the provision, operation and maintenance of a particle meter and for any restrictions which may be imposed by the Engineer in terms of blasting near structures.

Measurement will be the net area of rock face (parallel at right angles to the direction of drilling) measured on the payment line. Payment will only be made for excavations carried out in accordance with approved blasting patterns and which result in half barrels being visible over the major portion of the surface.

CWD09.13.3 TRIM BLASTING

It will be measured for payment in designated excavations or as ordered by the Engineer for the Permanent Works.

The rate shall deemed to include for blasting trials, any additional work for setting-up drilling equipment, any additional setting out and control measures, limited spacing and diameter of perimeter holes, any additional uncharged holes, the acquisition, transport, storage and the use of explosives, the handling and charge of explosives and stemming of holes. Trim blasting will not be more than 1m deep.

The rate shall deemed to include for the provision, operation and maintenance of a particle meter and for any restrictions which may be imposed by the Engineer in terms of blasting near structures.

Measurement will be the net area of rock (perpendicular the direction of drilling) measured on the payment line. Payment will only be made for excavations carried out in accordance with approved blasting patterns and which is within tolerance over the major portion of the surface.

CWD09.13.4 BULK BLASTING

UNIT: M³

It will be measured for payment in designated excavations or as ordered by the Engineer for the Permanent Works. All holes will be drilled vertical at a minimum depth of 2m per stage or as agreed.

The rate shall deemed to include for blasting trials, any additional work for setting-up drilling equipment, any additional setting out and control measures, the acquisition, transport, storage and the use of explosives, the handling and charge of explosives and stemming of holes.

The rate shall deemed to include for the provision, operation and maintenance of a particle meter and for any restrictions which may be imposed by the Engineer in terms of blasting near structures.

Measurement will be the in situ volume of rock measured on the payment line or calculated from blast design. Payment will only be made for excavations carried out in accordance with approved blasting patterns and which result in the maximum particle size of 400mm.

(a) Extra-over Clause CWD09.13.4 for restricted bench heights ≤ 2m.

The following sections were incorporated into this specification:

PS1.14.13 The Use of Explosives

CWD11.13.5 Explosives

CWD20.5 CONSTRUCTION

CWD20.5.1 Safety and Precautions

CWD20.5.1.3 Explosives

CWD20.5.4 Blasting

CWD20.5.4.1 General

CWD20.5.4.2 Preparation

CWD20.5.4.3 Notice to Blast

CWD20.5.4.4 Care of the works

CWD20.5.4.5 Control of Blasting

CWD20.5.4.6 Safety Measures

CWD20.5.4.7 Monitoring and Designing for Blasting Vibrations

CWD20.5.4.8 Perimeter Blasting

CWD20.5.4.9 Blasting Adjacent or Near Structures

CWD20.5.5 Foundation Requirements and Secondary Excavations

CWD20.8.3.1 Bulk excavation

CWD20.8.3.7 Perimeter blasting

C2.4 VARIATIONS AND ADDITIONS TO SPECIFICATIONS

General

The variations and addition to clauses in Section C2.1, C2.2 and C2.3 are lettered and numbered using the alphabetic identification of the applicable standardised specifications or the numeric identification of the applicable particular specifications. The number of the clauses is prefixed with the letter PS.

For example, variations and addition clauses are numbered as follows:

- For SABS 1200 A specification the clauses are lettered PSA.
- For specification CWD 23 the clauses are lettered PS23.

PS PROJECT DESCRIPTION

Add

PS 13 Information to be submitted by Contractor

The following information shall be submitted by the contractor at tender stage:

- (a) Method statement for blasting (PS 2.2 & 9.1)
- (b) Method statement for bock support (PS2.3 & 9.1)
- (c) Tendered contract program (PS 8.2)
- (d) Pro Forma Quality Management System (PS 9.2)
- (e) Pro Forma Health and Safety Plan (PS 11.1)

DEPARTMENT OF WATER AND SANITATION

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C3: PRICING DATA

CONTENTS

C3.1 PRICING INSTRUCTIONS

C3.2 BILL OF QUANTITIES

C3.1 PRICING INSTRUCTIONS

1. GENERAL

The Schedule of Quantities forms part of the Contract Documents and must be read and priced in conjunction with all the other documents comprising the Contract Documents which include the Conditions of Tender, Conditions of Contract, the Specifications (including the Project Specification) and the Drawings.

2. DESCRIPTION OF ITEMS IN THE SCHEDULE

The Schedule of Quantities has been drawn up generally in accordance with Civil Engineering Quantities 1990 issued by the SA Institution of Civil Engineers.

The short descriptions of the items in the Schedule of Quantities are for identification purposes only and the measurement and payment clause of the Standardised Specifications and each Particular Specification, read together with the relevant clauses of the Project Specification and directives on the drawings, set out what ancillary or associated work and activities are included in the rates for the operations specified.

3. QUANTITIES REFLECTED IN THE SCHEDULE

The quantities given in the Schedule of Quantities are estimates only, and subject to re-measuring during the execution of the work. Where quantities or sums are indicated as "Provisional,, the Employer reserves the right to adjust the quantity or sum upwards or downwards as necessary, or the item can be omitted altogether. The Contractor shall obtain the Engineer's detailed instructions for all work before ordering any materials or executing work or making arrangements for it.

The Works as finally completed in accordance with the Contract shall be measured and paid for as specified in the Schedule of Quantities and in accordance with the General and Special Conditions of Contract, the Specifications and Project Specifications and the Drawings. Unless otherwise stated, items are measured net in accordance with the Drawings, and no allowance has been made for waste.

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

4. PRICING OF THE SCHEDULE

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

Each item shall be priced and extended to the "Total" column by the Tenderer. If the Contractor omits to price any items in the Schedule of Quantities, then these items will be Considered to have a nil rate or price.

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

All rates and amounts quoted in the Schedule of Quantities shall be in Rand and shall include all levies and taxes (other than VAT). VAT will be added in the summary of the Schedule of Quantities.

5. CORRECTION OF ENTRIES

Incorrect entries shall not be erased or obliterated with correction fluid but must be crossed out neatly. The correct figures must be entered above or adjacent to the deleted entry, and the alteration must be initialled by the Tenderer.

6. MONTHLY PAYMENTS

Unless otherwise specified in the Specifications and Project Specifications, progress payments in Interim Certificates, referred to in Clause 6.10 of the General Conditions of Contract 2015 (Third edition), in respect of "sum" items in the Schedule of Quantities shall be by means of interim progress instalments assessed by the Employers Agent and based on the measure in which the work actually carried out relates to the extent of the work to be done by the Contractor.

7. UNITS OF MEASUREMENT

The units of measurement described in the Schedule of Quantities are metric units for which the standard international abbreviations are used. Non-standard abbreviations which may appear in the Schedule of Quantities are as follows:

No. = number Sum = Lump sum

8. ARITHMETICAL ERRORS

- (a) Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern;
- (b) If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted shall govern and the line item total shall be corrected. However, in exceptional cases where, in the opinion of the Employer, there is an obviously gross misplacement of the decimal point in either the unit rate or line total, or where the error was obviously not a result of incorrect arithmetic but rather the result of a writing error, the Employer reserves the right to correct either the tendered rate or the line total as the case may be, subject to clarification in terms of Clause F.2.17.
- (c) 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 be adjusted to obtain the correct tender value."

C3.2 BILL OF QUANTITIES

ITEN NO	NO REF				QTY	RATE	AMOUNT
SEC	SECTION A : PRELIMINARY AND GENERAL						
		CWD01SC	A1 - FIXED-CHARGE ITEMS				
A1.	10	5.3.1	Establishment of Facilities for Contractor on site	Sum	1		
A1.	20	5.3.2	Removal of Site Establishment	Sum	1		
A1.	30	5.3.3	Temporary de-establishment	Sum	2		
A1.	40	5.3.4	Re-establishment after temporary de-establishment	Sum	2		
			A2 - TIME-RELATED ITEMS				
A2.	10	5.4.1	Health and Safety	Sum	1		
A2.	20	5.4.2	Supervision for Duration of Contract	Sum	1		
			Total Carried forward to Summary	1.		1	

ITE NO		PAY REF		SHORT DESCRIPTION	UNIT	QTY	RATE	AMOUNT
SE	CTION	B: BLASTIN	IG					
		CWD09		BLASTING				
AP	PROAG	CH CHANNE	LΑ	ND INLET ON LEFT BANK (Refer D	org CWD 10	001-1003))	
				Phase 1				
B.	10	13.200	-	Perimeter Blasting	m²	6 000		
B.	20	13.300		Trim Blasting	m²			Rate Only
B.	30	13.400		Bulk Blasting	m³	90 000		
B.	40	13.4 (a)		Extra over bench ≤ 2m Phase 2	m³			Rate Only
B.	50	13.200	_	Perimeter Blasting	m²	2 000		
B.	60	13.400		Bulk Blasting	m³	4 000		
В.	70	13.4 (a)		Extra over bench ≤ 2m	m³			Rate Only
LEF	T BAN	IK NOC		·		ı	1	
В.	80	13.200	-	Perimeter Blasting	m²	3 500		
В.	90	13.300	ļ Ī	Trim Blasting	m²			Rate Only
B.	100	13.400		Bulk Blasting	m³	14 000		
B.	110	13.4 (a)		Extra over bench ≤ 2m	m³			Rate Only
LEF	T BAN	K OUTLET	NO	RKS				
B.	120	13.200	-	Perimeter Blasting	m²	3 600		
B.	130	13.300		Trim Blasting	m²			Rate Only
B.	140	13.400		Bulk Blasting	m³	33 200		
В.	150	13.4 (a)		Extra over bench ≤ 2m	m³			Rate Only
SPI	LLWA	Y AND APRO	N					· · · · · · · · · · · · · · · · · · ·
B.	160	13.200	-	Perimeter Blasting	m²	200		
В.	170	13.300		Trim Blasting	m²			Rate Only
В.	180	13.400		Bulk Blasting	m³	12 000		
В.	190	13.4 (a)		Extra over bench ≤ 2m	m³			Rate Only
RIG	НТВА	NK NOC AND	0 0	UTLET				
В.	200	13.200	-	Perimeter Blasting	m²	7 000		
B.	210	13.300		Trim Blasting	m²			Rate Only
В.	220	13.400		Bulk Blasting	m³	45 000		
В.	230	13.4 (a)		Extra over bench ≤ 2m	m³			Rate Only
		<u> </u>		Total Carried forward to Summary			An-	

ITE!	W	PAY REF	SHORT DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	TION	C: ROCK S	JPPORT				
		CWD08	ROCK SUPPORT				
APF	PROA	CH CHANNE	L, INLET AND LEFT BANK NOC (Refer	r Drg CW	D 1001-1	003)	
	_		Phase 1				
С	10	11.2.3 (a)	Rock bolts supplied and installed	No	1100		
С	20	11.2.3 (b)	Extra over for rock bolt length	m	14300		
С	30	11.2.3.(c)	Checking tension and or re tensioning	No			
С	40	11.2.5	Shotcretre	m²			
С	50	11.2.7	Double Twisted Wire Mesh	m²	2000		
LEF	T BAI	NK OUTLET	WORKS				
С	60	11.2.7	Double Twisted Wire Mesh	m²	3200		
SPII	LLWA	Y AND APRO	ON				
С	70	11.2.7	Double Twisted Wire Mesh	m²	407		
RIG	HTBA	NK NOC AN	D OUTLET				

Total Carried forward to Summary

SEC	TION	D: PROVISIONAL SUMS			
PS.	1	 Provisional amount for specialist design and Installation of Rock anchor supports Percentage Mark up on PS1 above 	Prov. Sum	20 000	
ro.	2	Total Carried forward to Summary			

SUMMARY OF	BILL OF QUANTITIES	
SECTION	DESCRIPTION	AMOUNT
	PRELIMINARY AND GENERAL	
A1	FIXED CHARGES	
A2	TIME RELATED CHARGES	
	SUB TOTAL A	
	DIRECT WORKS	
В	BLASTING	
С	ROCK SUPPORT	
	to the state of th	
	SUB TOTAL B	
D	PROVISIONAL SUMS	
	SUB TOTAL (A+B+Prov sums)	
	20 % CONTINGENCIES	
	15 % VAT	
	TOTAL	

DEPARTMENT OF WATER AND SANITATION

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THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

C4. DRAWINGS

CONTENTS

C4.1 TENDER DRAWINGS

C4.1 TENDER DRAWINGS

The drawings issued to the tenders as part of the tender documents must be regarded as provisional and preliminary for the tenderer's benefit to generally assess the scope of work.

The work shall be carried out in accordance with the latest available revision of the drawings approved for construction (AFC)

At commencement of the contract, the Engineer shall deliver to the Contractor copies of the AFC drawings and any instructions required for the commencement of the works. From time to time there after during progress of the works, the Engineer may issue further drawings for construction purposes as may be necessary for adequate construction, completion and defects correction of the works.

All drawings and specifications and copies thereof remain the property of the Employer, and the Contractor shall return all drawings and copies thereof to the Employer at the completion of the contract.

LIST OF DRAWINGS

EXCAVATION FOR THE APPROACH CHANNEL, COFFERDAM AND INLET WORKS UPSTREAM OF DAM WALL

CWD1301	1 of 5	Approach channel and coffer dam excavation Phase 1
CWD1302	2 of 5	Approach channel and coffer dam excavation Phase 2
CWD1303	3 of 5	Approach channel and coffer dam excavation sections
CWD1304		Approach channel and coffer dam excavation sections
CWD1305	5 of 5	Approach channel and coffer dam excavation sections
CWD1321	1 of 3	Excavation parapet slabs: Key plan
CWD1322	2 of 3	Excavation: Parapet Slabs A and B details
CWD1323	3 of 3	Excavation: Parapet Slab C – F detail

EXCAVATION FOR THE OUTLETWORKS DOWNSTREAM OF DAM WALL

CWD1311	1 of 3	Outlet pipe encasement: Excavation Plan
CWD1312	2 of 3	Outlet pipe encasement: Sections
CWD1313	3 of 3	Outlet pipe encasement: Sections

EXCAVATION FOR LEFT NONE OVERSPILL SECTION DOWNSTREAM OF DAM WALL AND ABOVE EXISTING LEVEL TO NEW LEVEL.

```
      CWD1341
      1 of 6
      Plan view

      CWD1342
      2 of 6
      Downstream view of NOC

      CWD1343
      3 of 6
      Sections

      CWD1344
      4 of 6
      Sections

      CWD1345
      5 of 6
      Sections

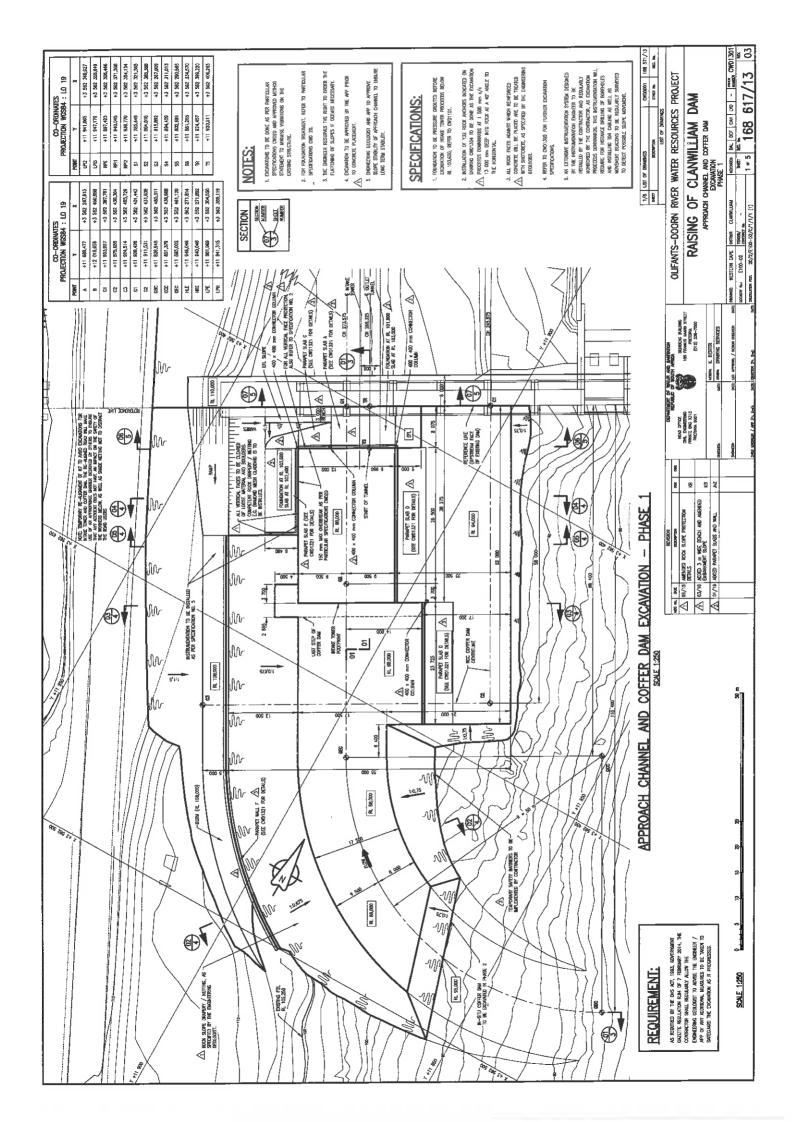
      CWD1346
      6 0f 6
      Sections
```

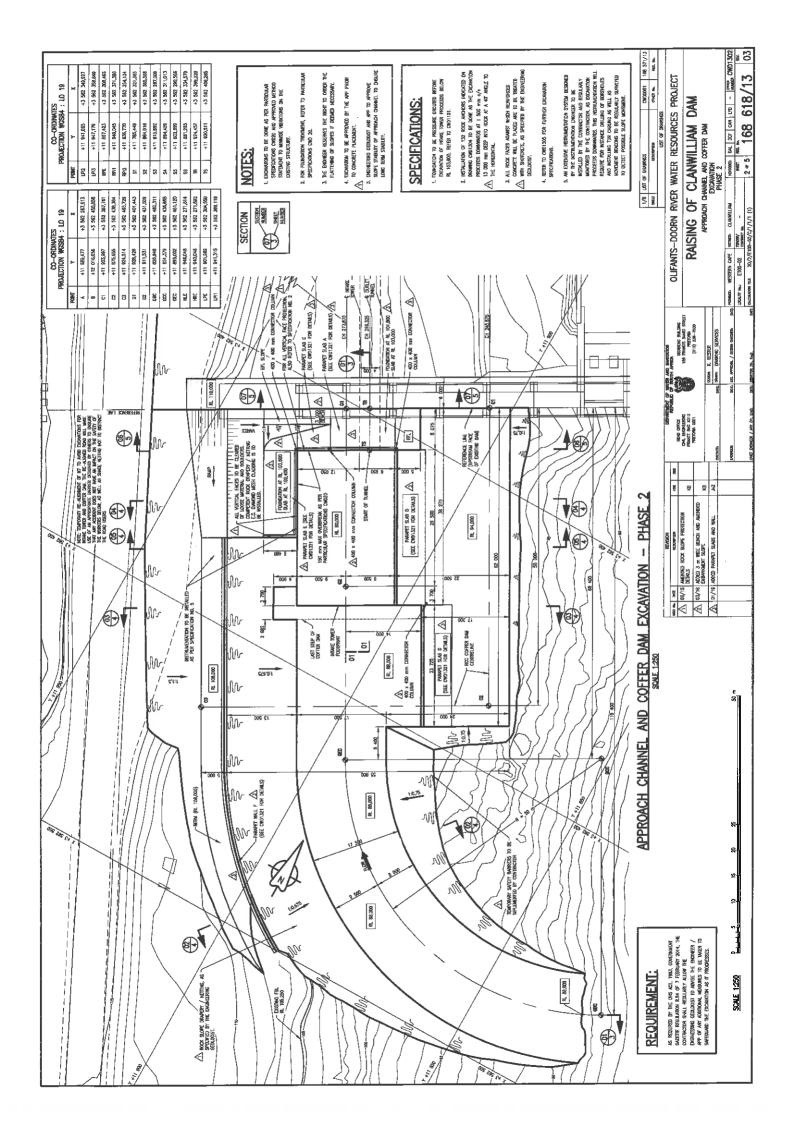
EXCAVATION FOR SPILLWAY SECTION BELOW EXISTING APRON DOWNSTREAM OF DAM WALL

CWD1371	1 of 6	Downstream elevation
CWD1372	2 of 6	Section 01 - 01
CWD1373	3 of 6	Section 02 - 02
CWD1374	4 of 6	Section 03 - 03
CWD1375		Section 04 - 04
CWD1376	6 Of 6	Excavation plan view and setting out details

EXCAVATION FOR RIGHT NONE OVERSPILL SECTION DOWNSTREAM OF DAM WALL AND ABOVE THE EXISTING LEVEL TO NEW LEVEL.

CWD1351	1 of 5	Plan
CWD1352	2 of 5	Longitudinal section
CWD1353	3 of 5	Typical cross section
CWD1354	4 of 5	Typical cross section
CWD1355	5 of 5	Typical cross section





ABBREVIATIONS:

EFL: EBTINATED FOUNDATION LEVEL

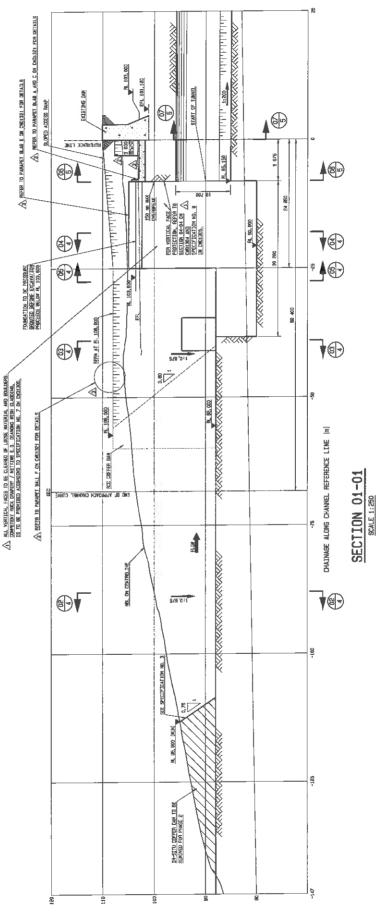
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SPECIFICATIONS:

- FOUNDATION TO BE PRESSURE GROUTED BETORE EXCAVATION OF INTAKE TOMER PROCEEDS BELON RL 103, 500. REFER TO CN03101.
- ⋖ 2. THEYALLATON OF Y22 NOCK BOLTS INDICATED ON CHOPOSD TO BE DONE AS THE EXCAVATION PROCEEDS DOINNIARDS B 1 500 mm c/c 13 000 mm UEEP INTO ROCK.
 - 3, POSITION OF IN-SITU COFFER DAM WILL BE DETERMINED BY THE DAM MATER LEYEL.
 - 4. REFER TO CHOLODE, FOR FURTHER SPECIFICATIONS.
- NOTES:
- 1. EXCAVATIONS TO BE OTINE AS PER PARTICIALAR SPECIFICATIONS CAND APPROVED WEINIO STATEMENT TO REDUCE VIBRATIONS ON THE EXISTING STRUCTURE.

SECTION NUMBER 3 SHEET SECTION

- 2. FOR FOUNDATION TREATMENT, REFER TO PARTICULAR BPECIFICATIONS CND 20.
- 3, THE ENBINEER REBENYES THE RIGHT TO ORDER THE FLATTENIANS OF SLOWES IF DECEND NECESSARY.
- EXCAVATIONS TO BE APPROVED BY THE APP PRICA TO CONCRETE PLACEMENT.



RAISING OF CLANWILLIAM DAM
APPROACH CHANKEL AND COFFER DAW
EXCANATION
SECULATION
SECULATION
100-02 | Seculation | Seculati DLIFANTS-DOORN AIVER WATER RESOURCES PROJECT 1/8 LTST DF DRAITINGS BACKT MONINCE MESTERN CARE OLIVINICE CLANKELLEAN
LUCKALITY No.: 6200-02 CARNES NO.
CAROLATON FILE: 20/2/5100-02/C/11/1/1 [1] SEDTERNO RUTLODES 138 FRANCIS BAJED STREET PRETORIA (0.12) 339-7500 WESTON K. BESTER STULING SERVICES DEPARTMENT OF NATION AND SAMETATION OF THE SEDICE OF THE S HEAD OFFICE CIVIL ENGINEERING PRIVATE BAD X313 PRETIBILA ODDI ē 8 8 ZA

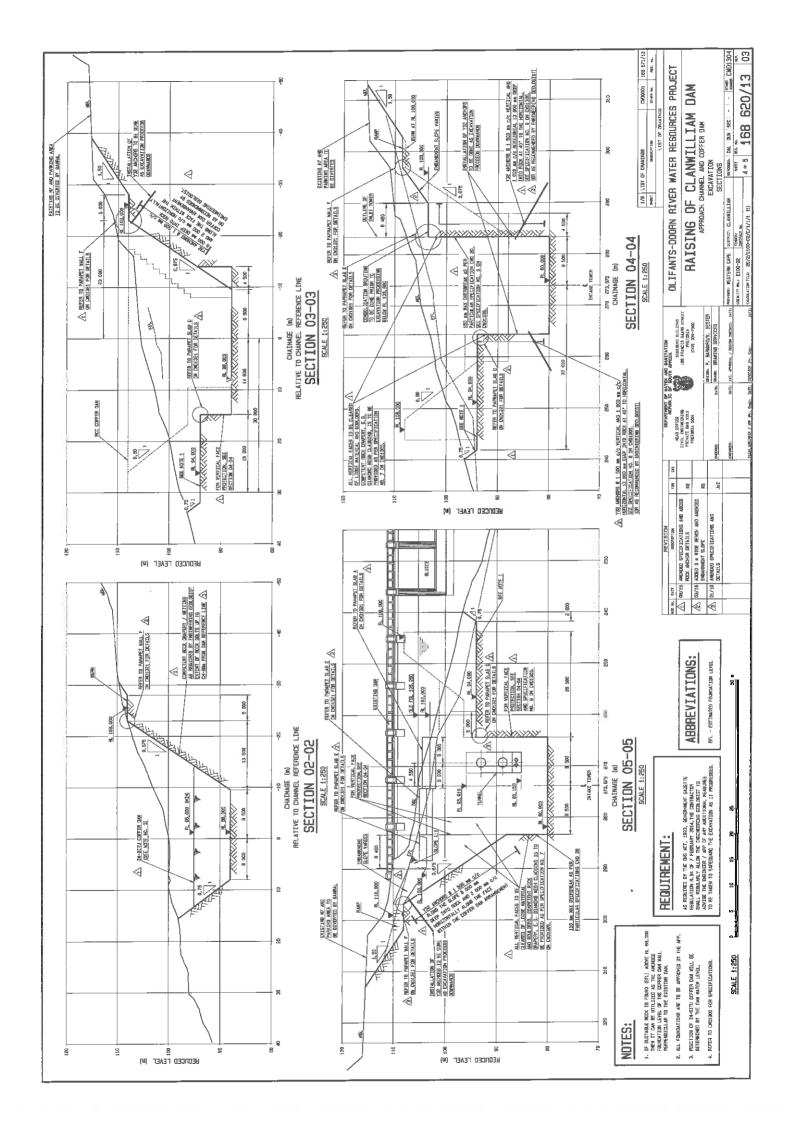
ANENDED FIDEX BLOPE PROTECTION
DETAILS

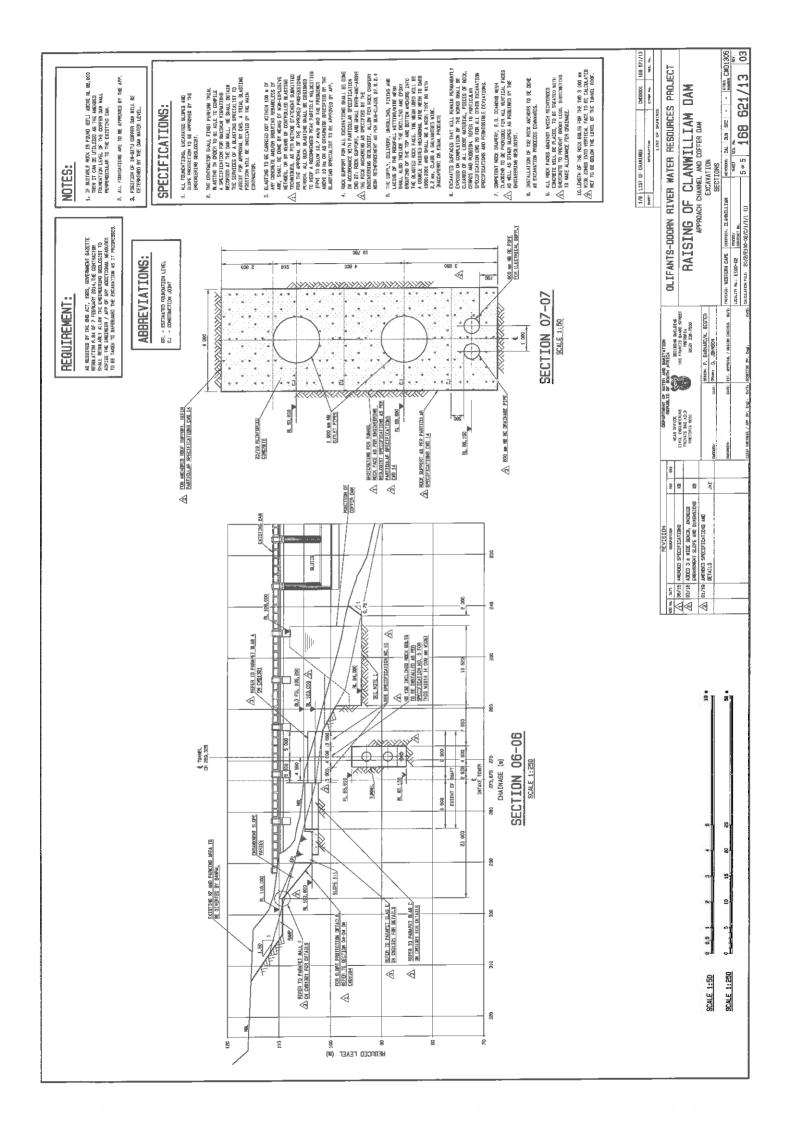
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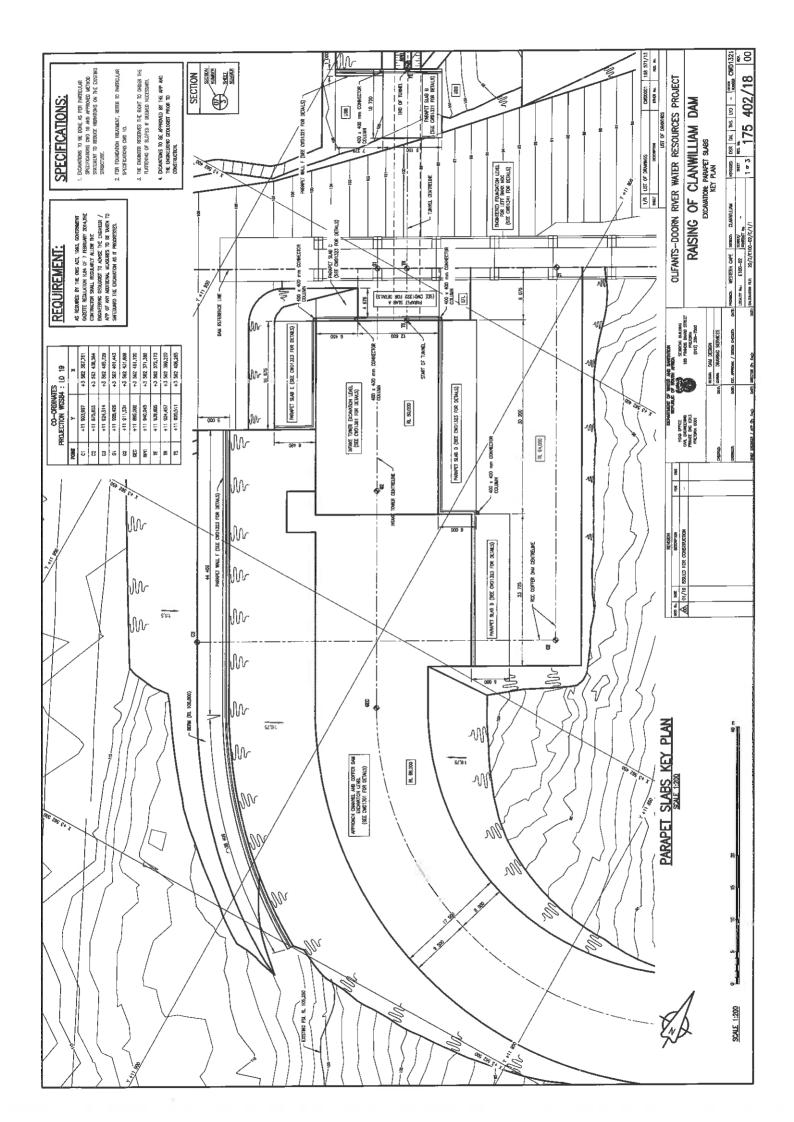
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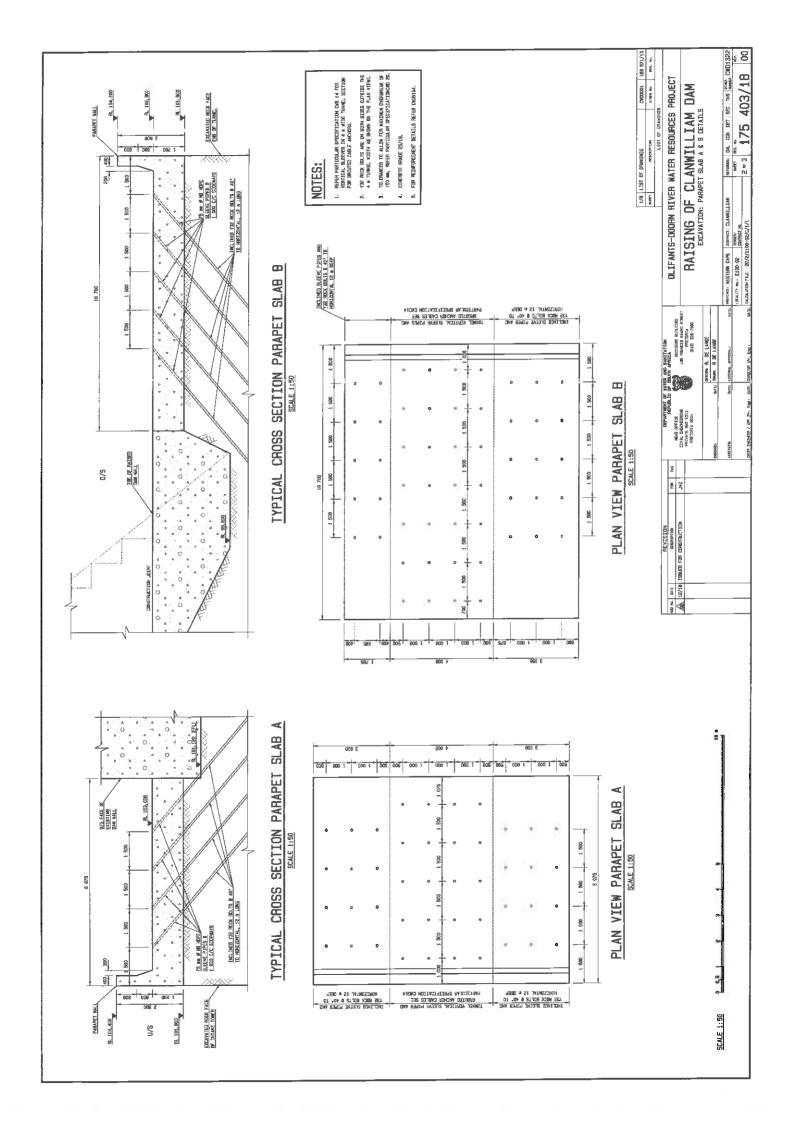
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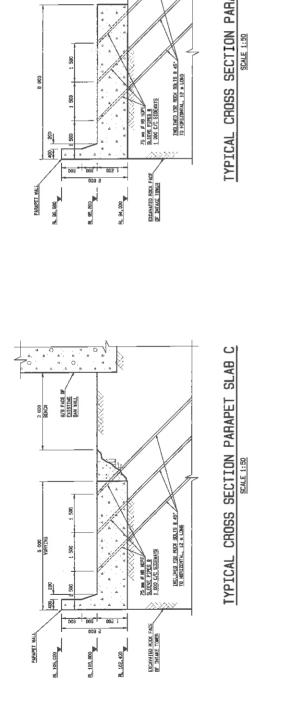
BEDICED LEVEL (a)









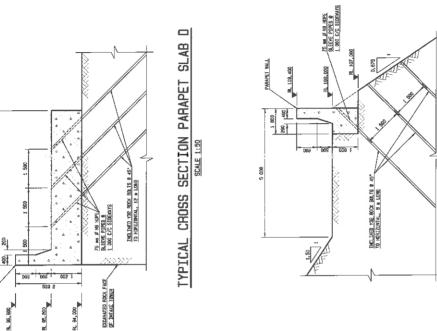


3. TOLERANCES TO ALLOW FOR MAXIMUM OVERBREAK OF 150 MM, REFER CHO 20.

4, CONCRETE BRADE 25/19.

1. REPER PARTICULAR SPELIFICATION CNO 14 FOR VERTICAL SLEVES IN 4 m NIDE TUNNEL BECTION FOR CABLE ANCHORS. 2. FOR REINFORCEMENT DETAIL REFER CMOS154

NOTES:



PARAPET HALL FL. 105,000 FL 104, 200

								1/B LIBT	1/B LIBT OF DRAWINGS	CMD0001	168 571/13
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									LIST OF DRANINGS	99	
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1				Γ	PREVATE BAB X313 PRETOREA ODDA	CA 0001 (G12) 339-7500	RAI	RAISING OF CLANWILLIAM DAM	ANWILLIAM	I DAM	
_								EXCAVATION: PARAPET SLAB C - F DFTAIL	T SLAB C - F DFTAT	_	
_	-					JESTON R. DE LANGE					
_			_		CHECKER	BRUMM, R DE LANGE					
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TYPICAL CROSS SECTION PARAPET WALL F

TYPICAL CROSS SECTION PARAPET SLAB E

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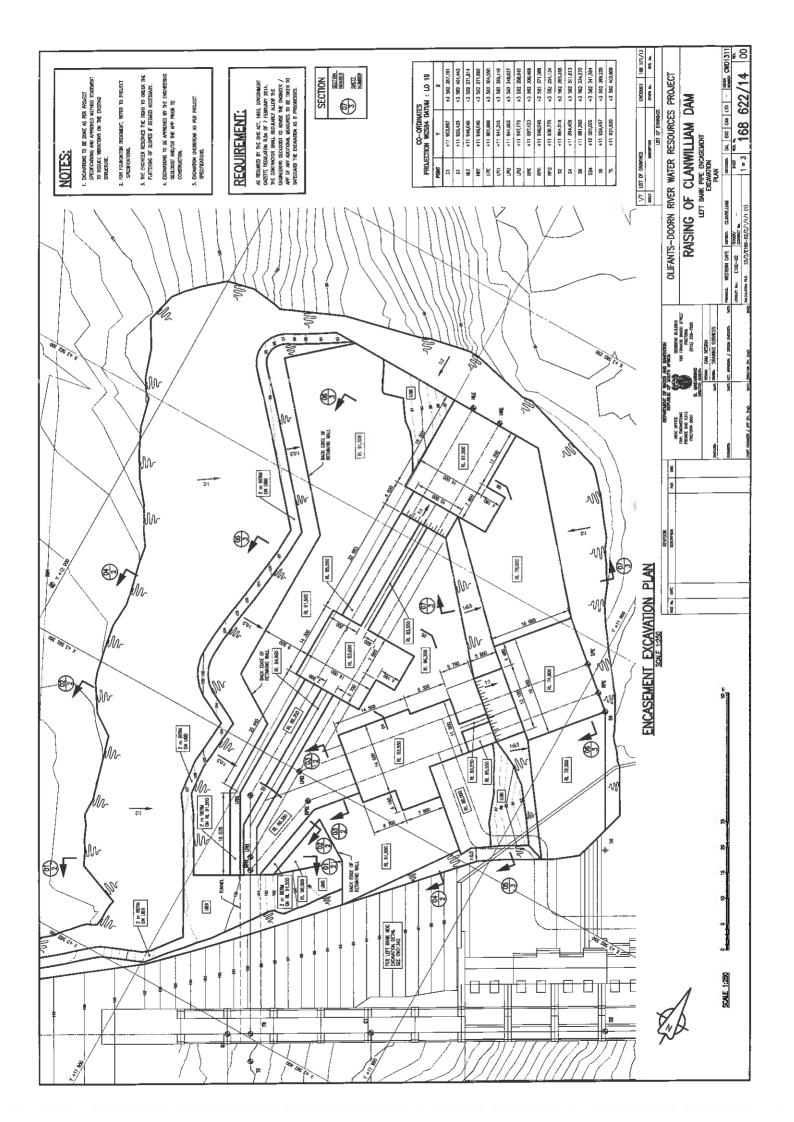
EXCAVATED ROCK FACE OF INTAKE TONER

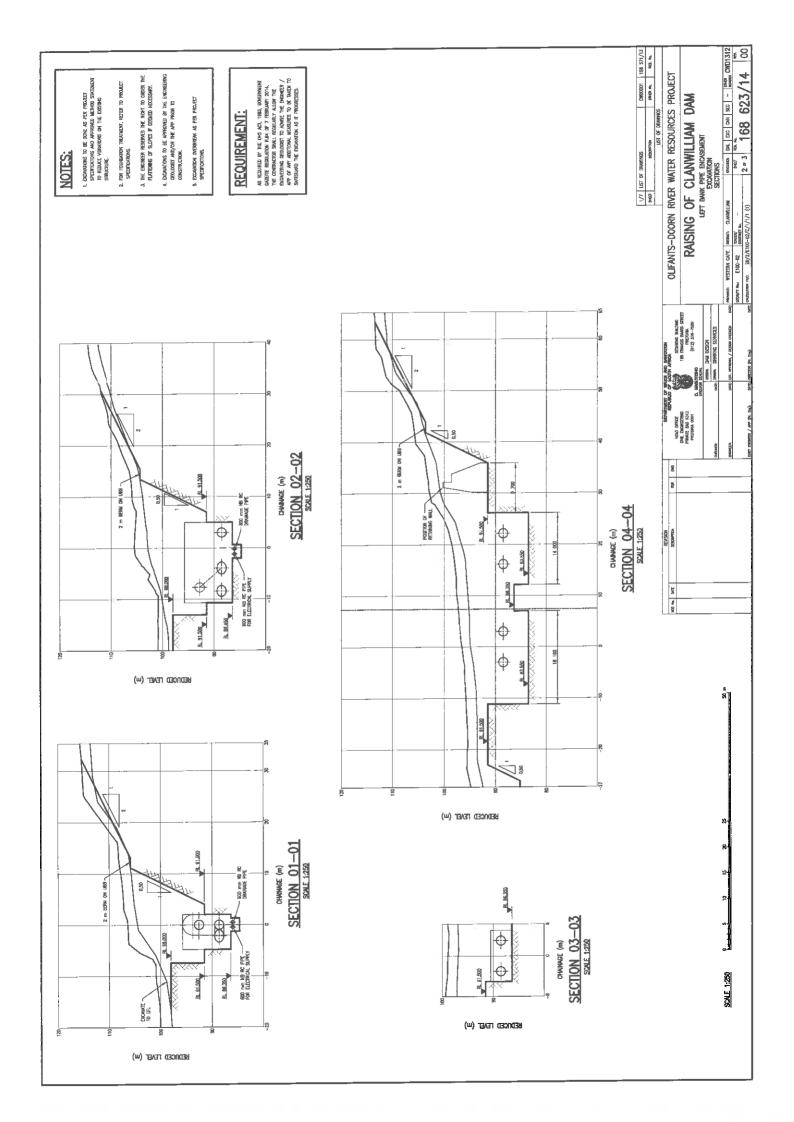
SLEEVE PIPES 8 1 000 C/C STOEMAYS

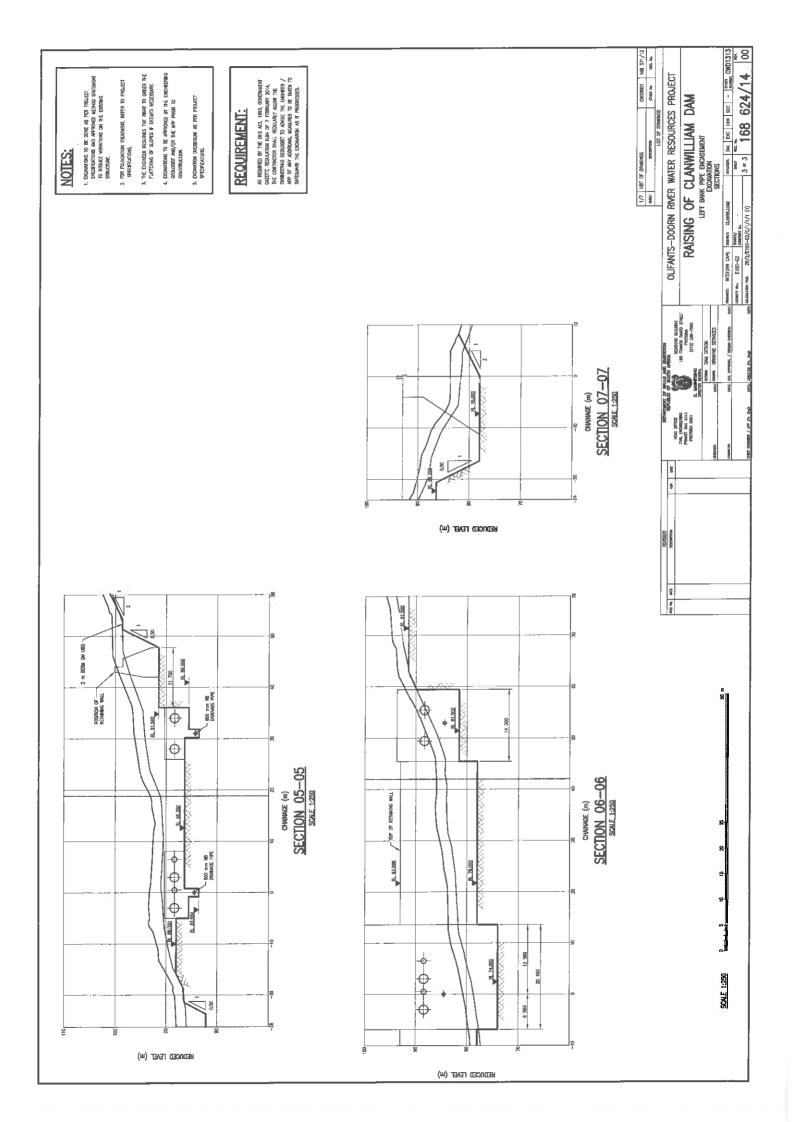
INCLINED Y38 HOUX BOLTS & 45*

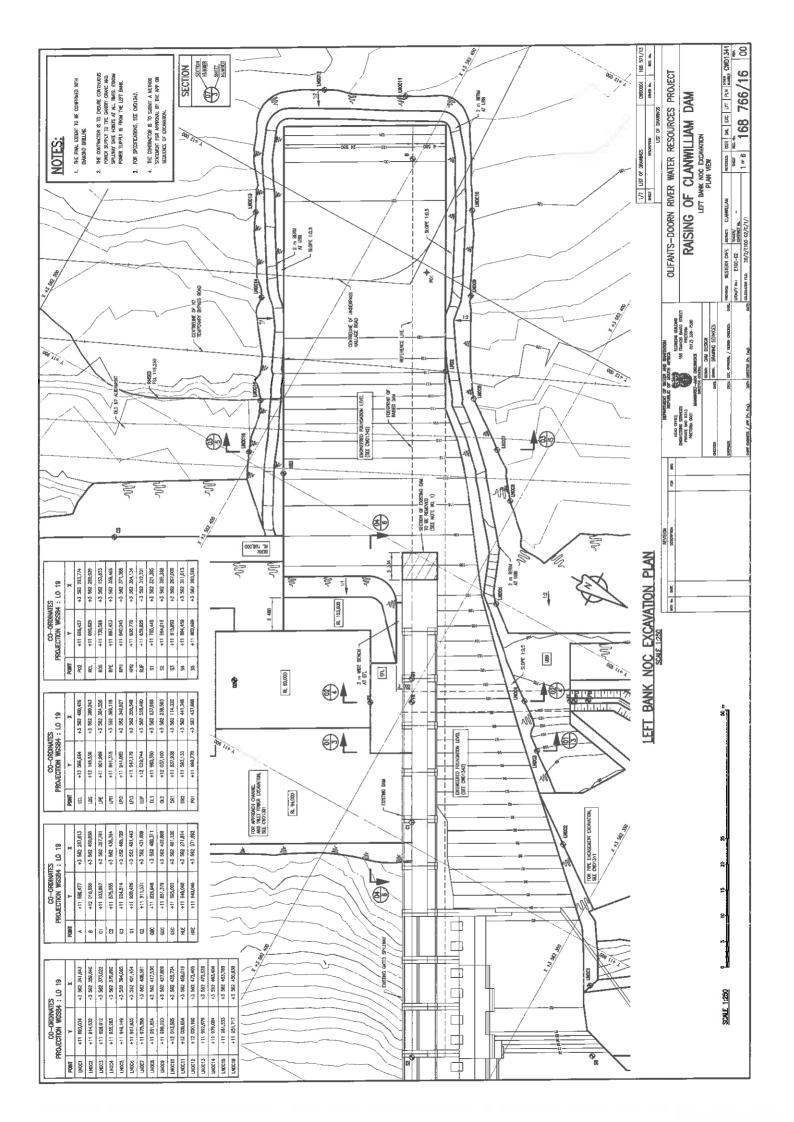
R. 102,400

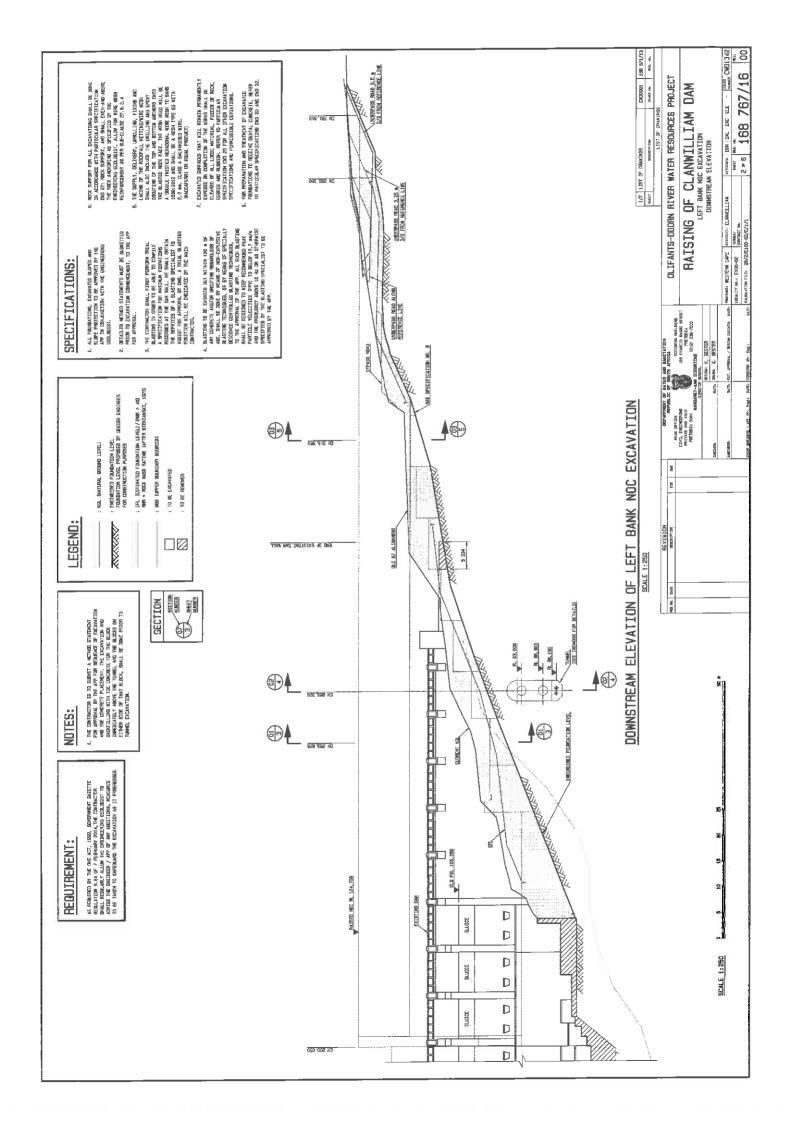
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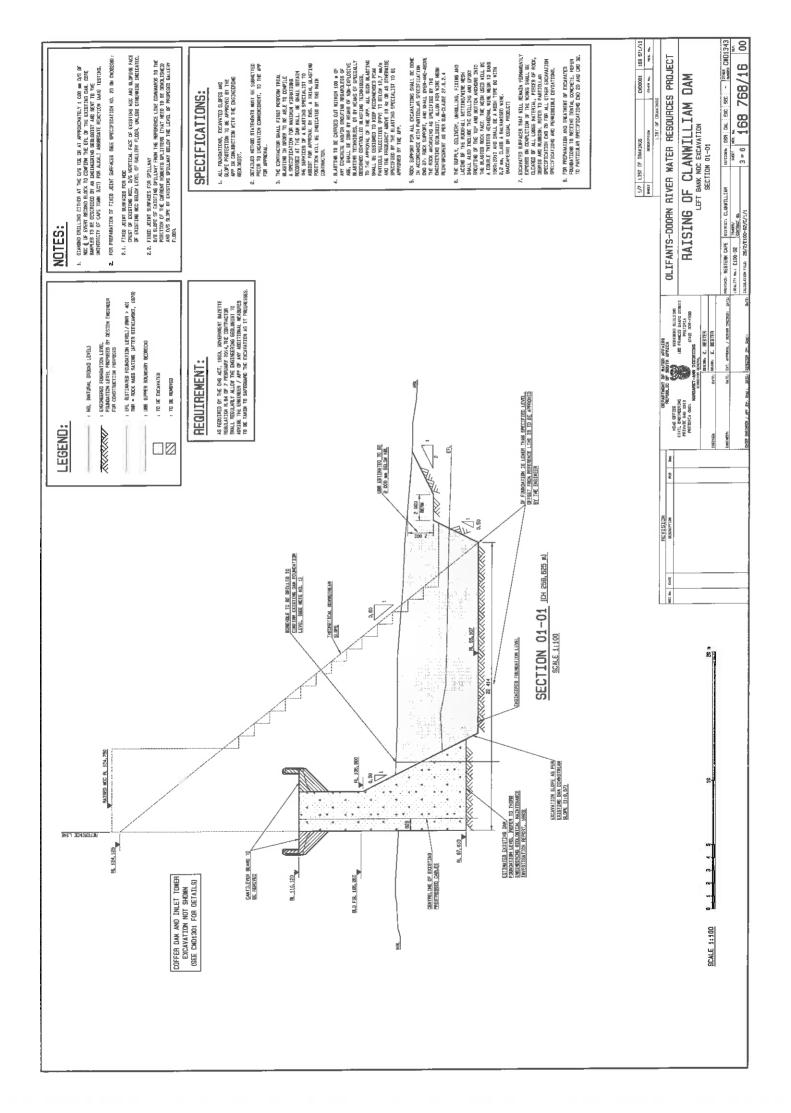


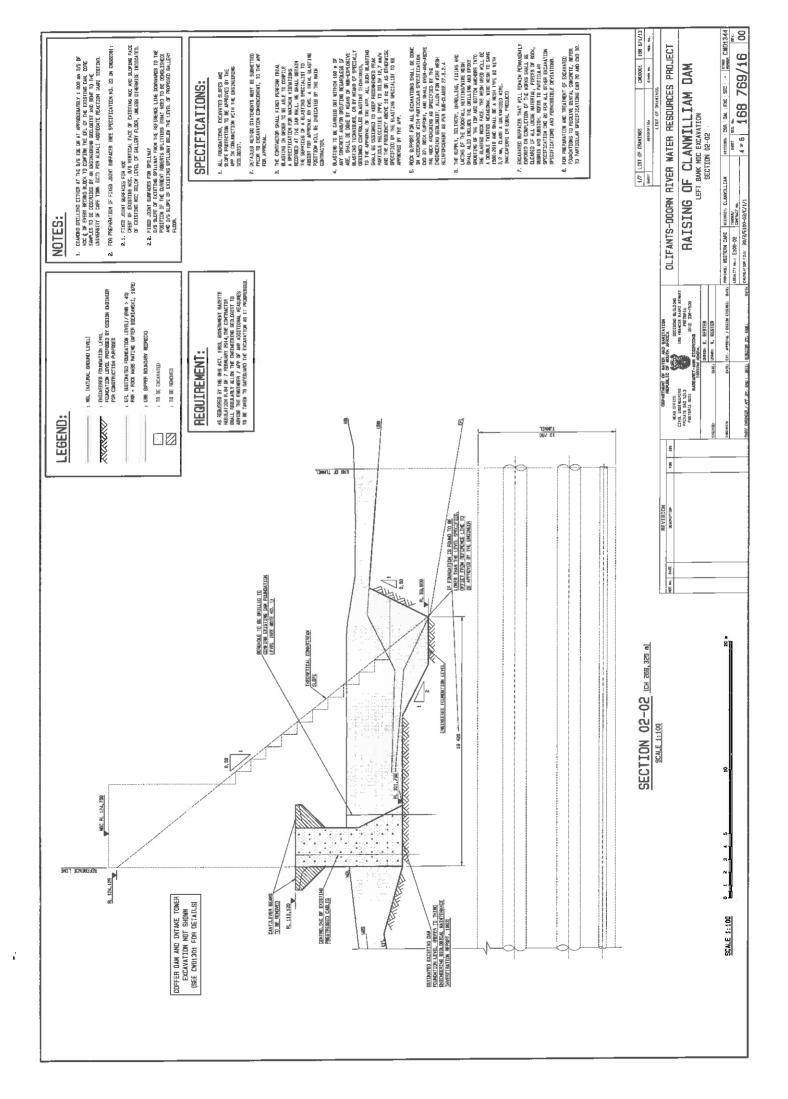


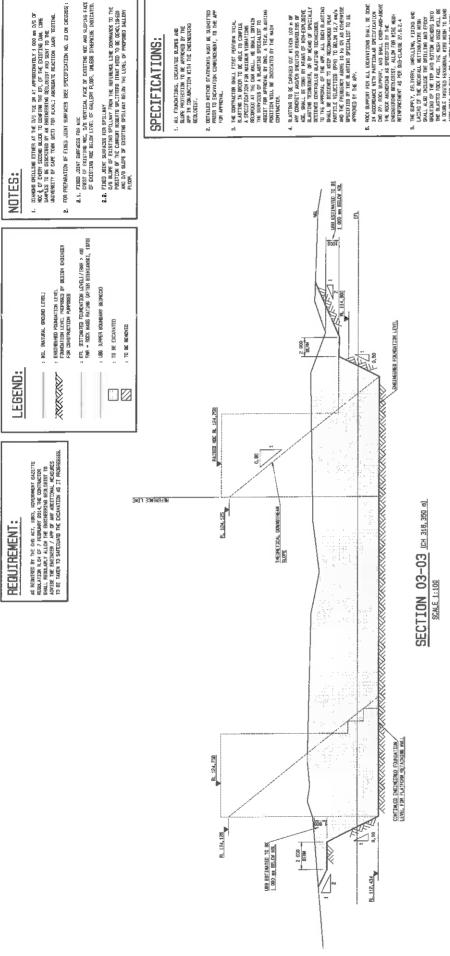












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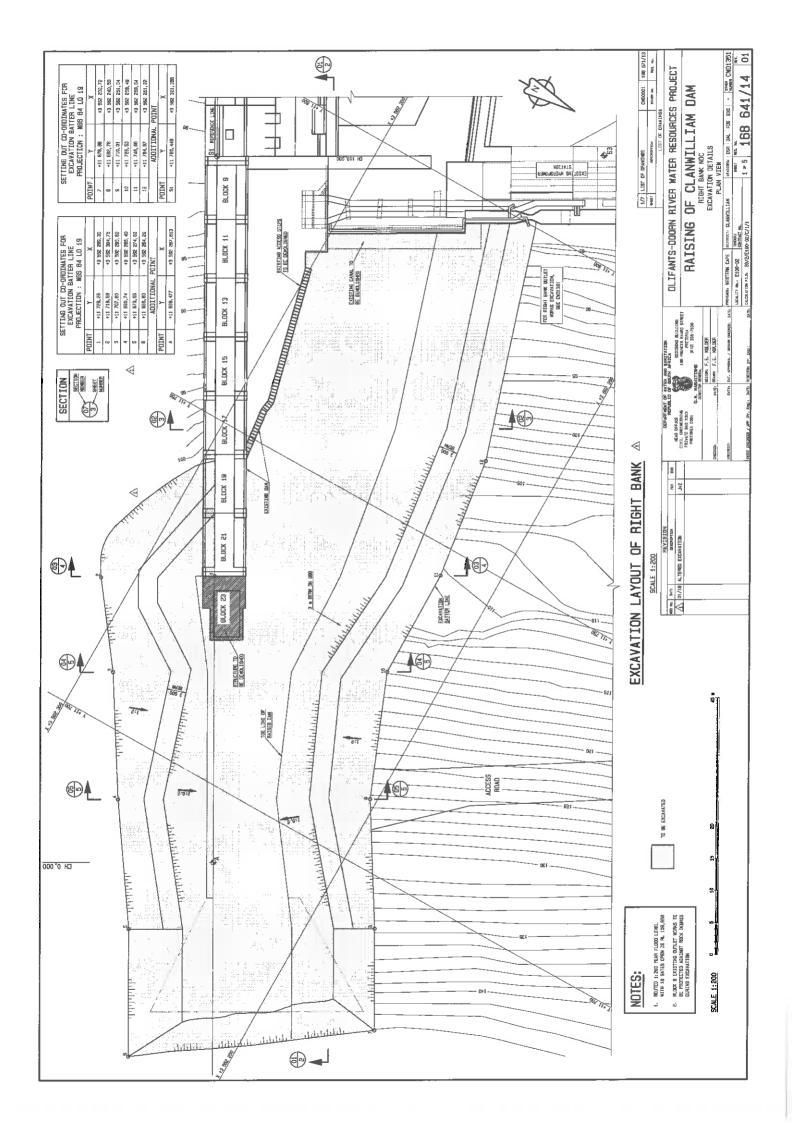
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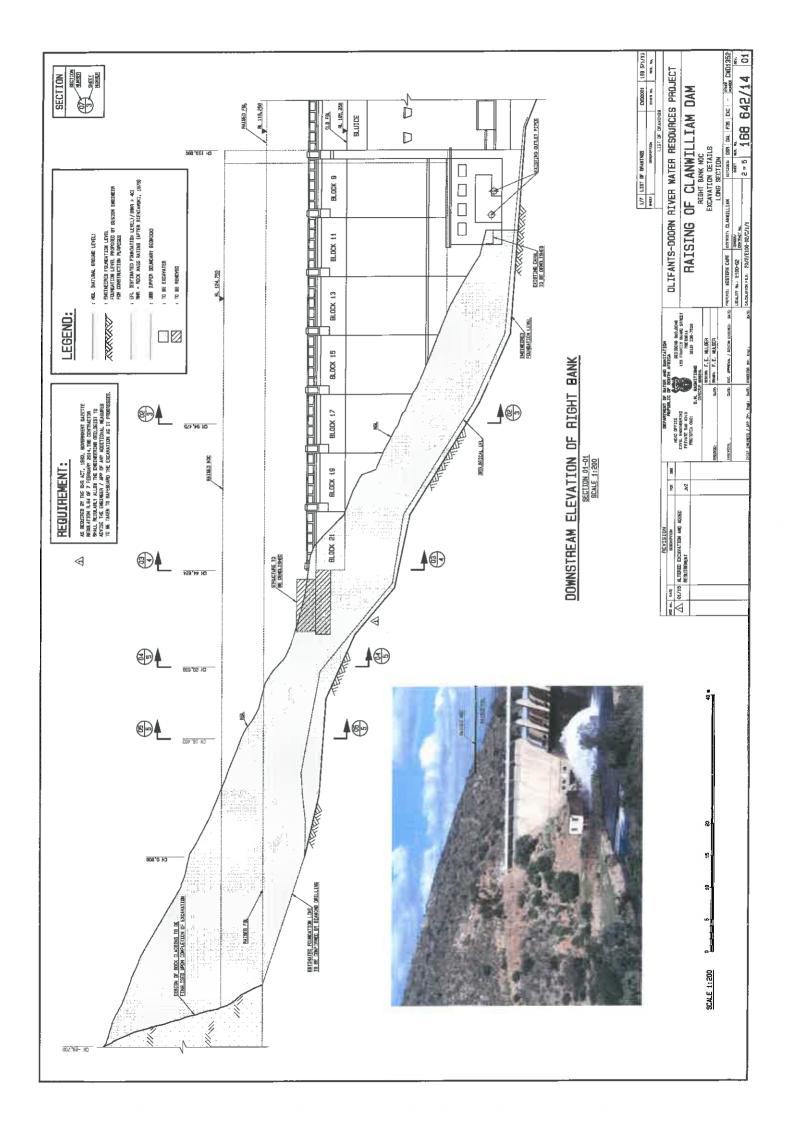
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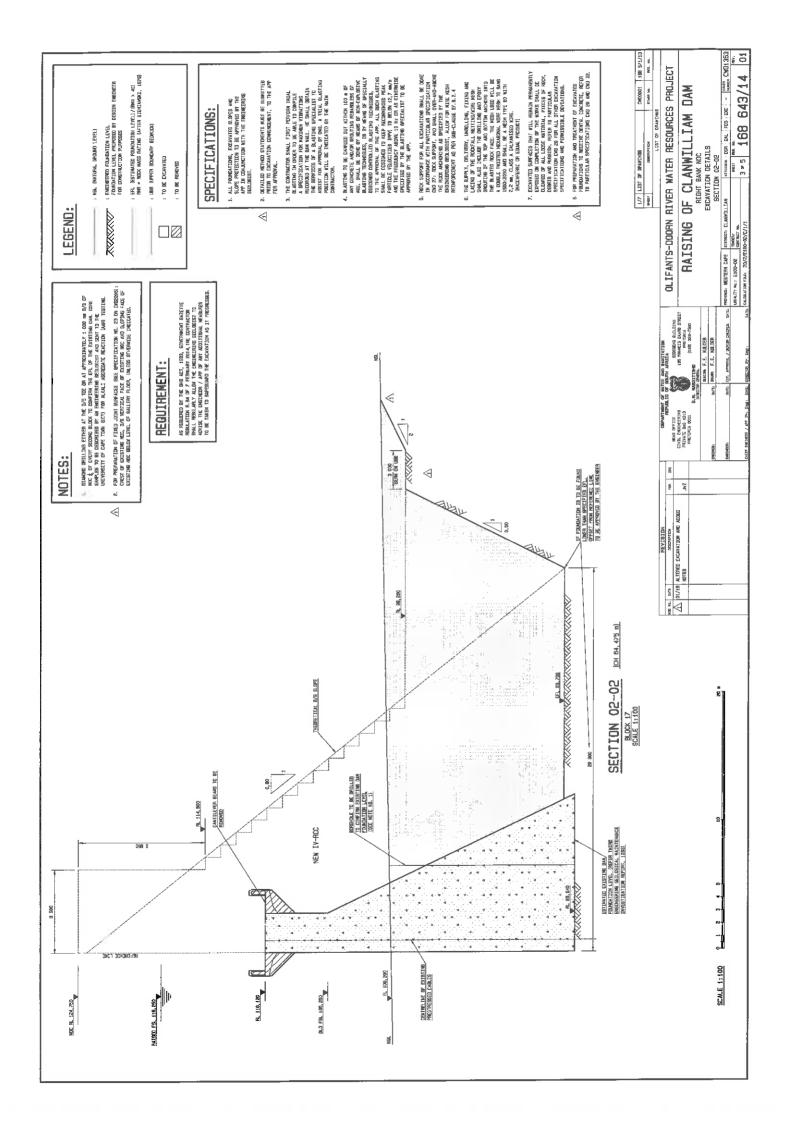
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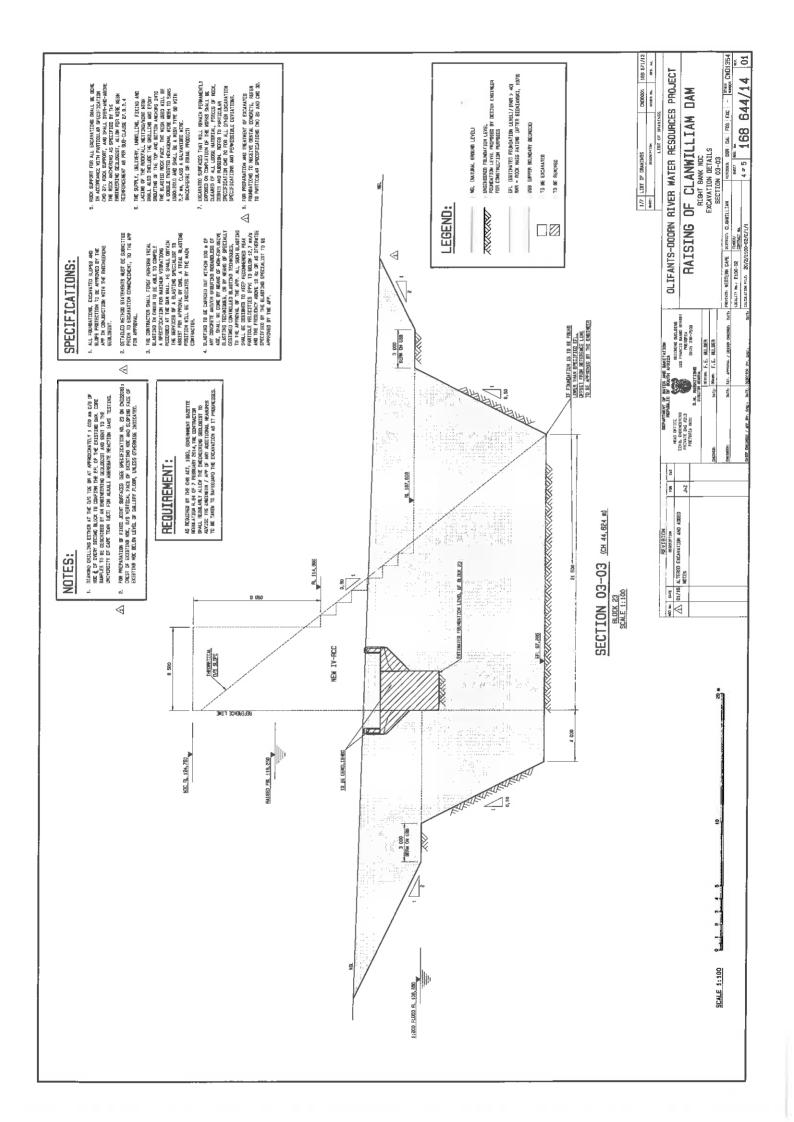
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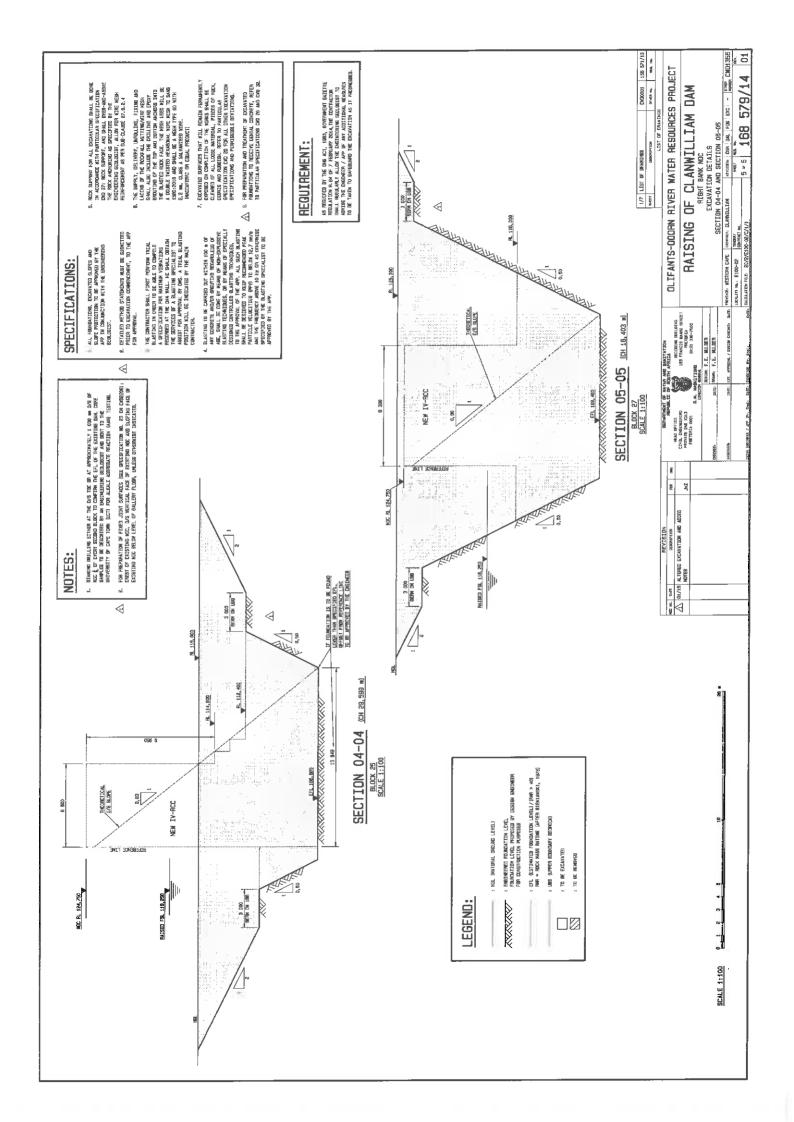
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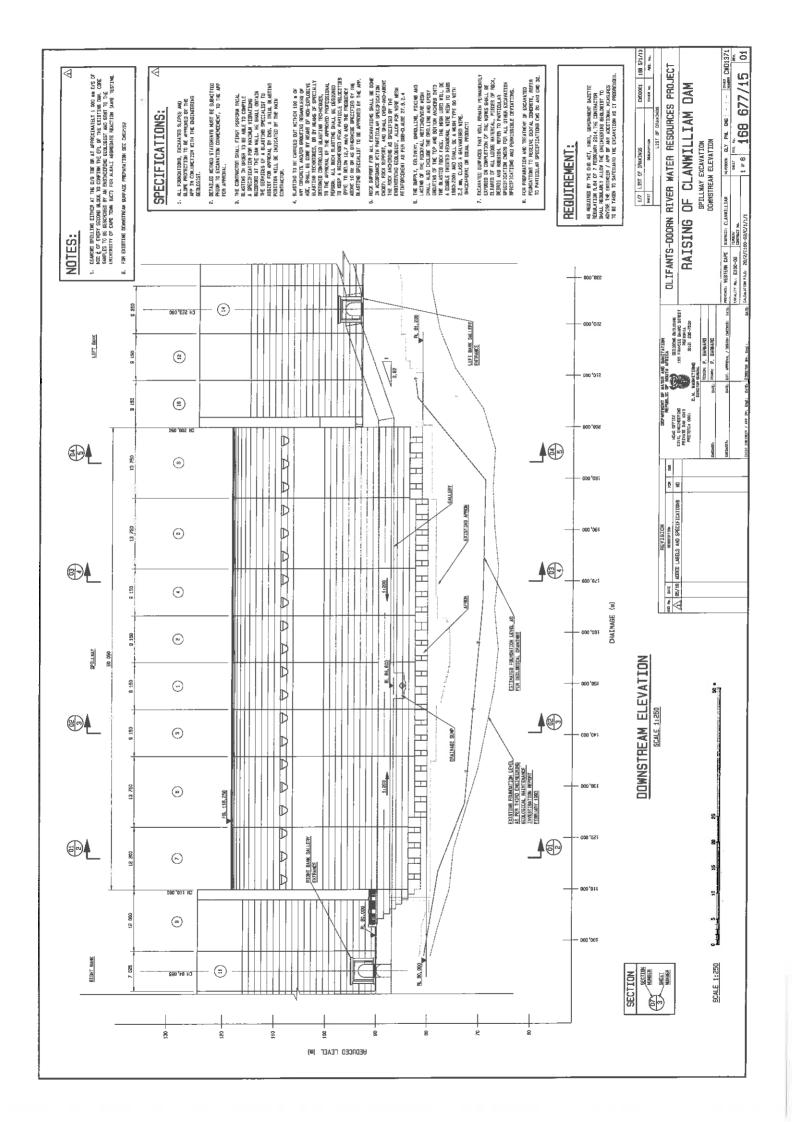


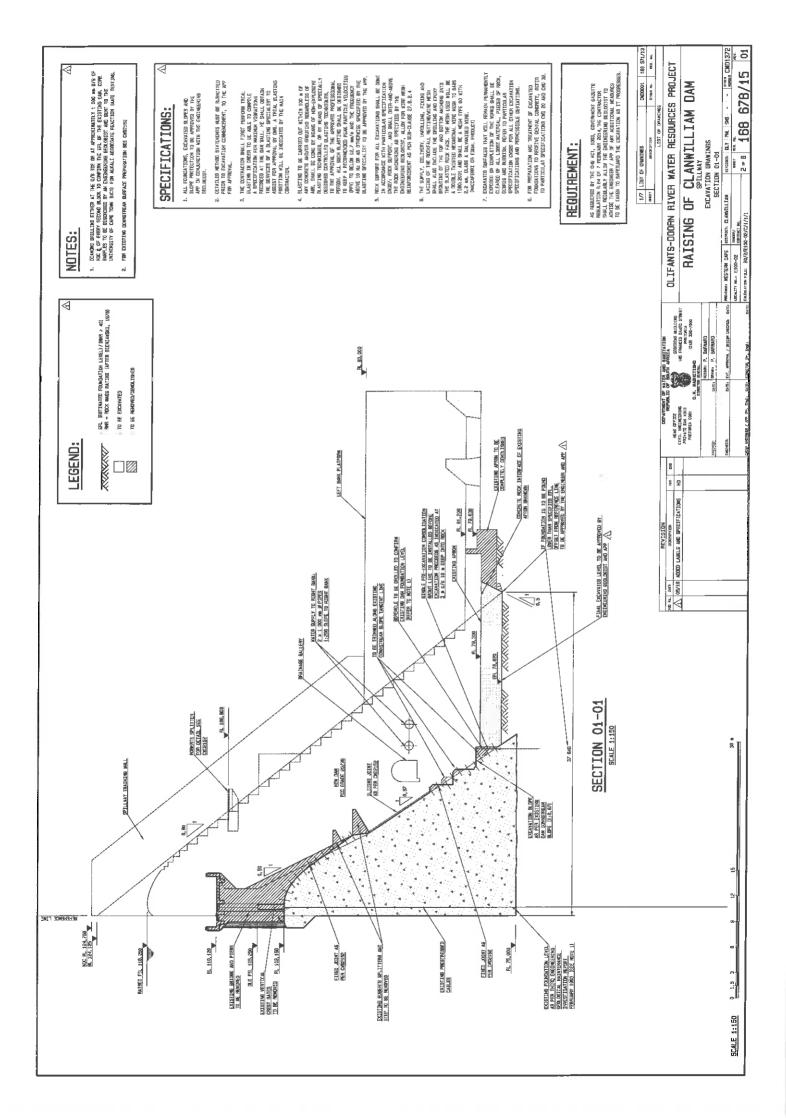


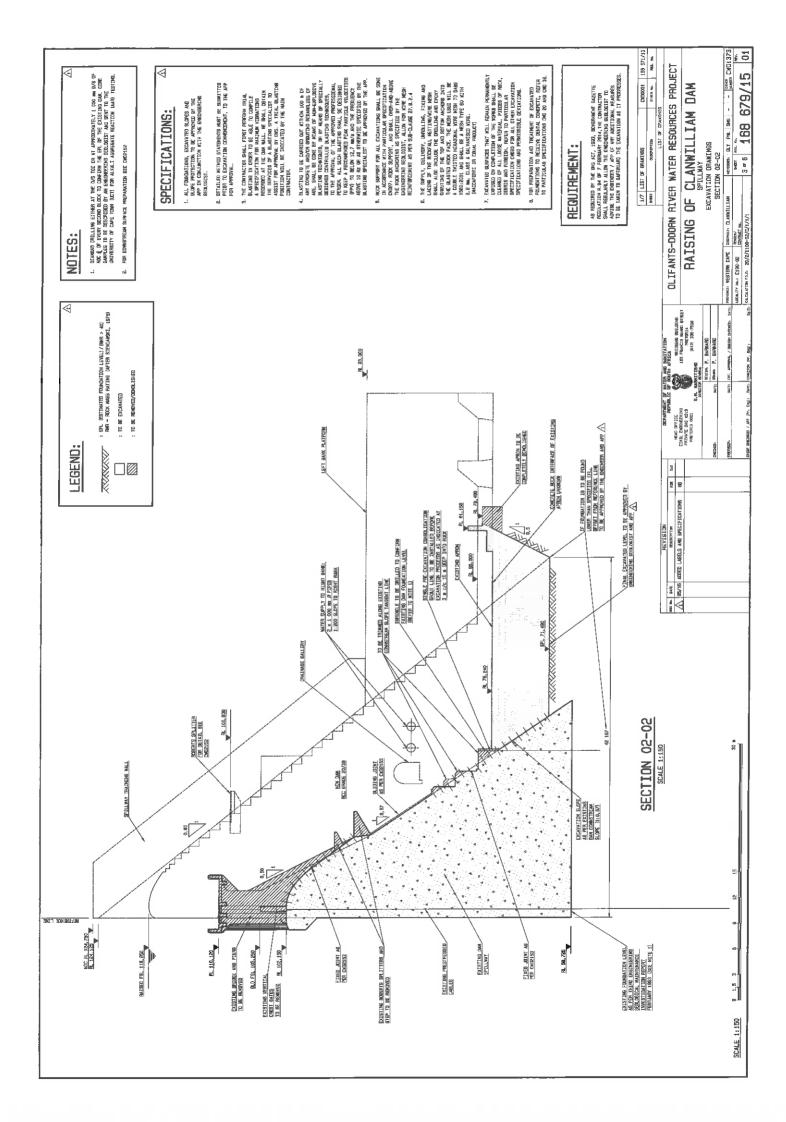


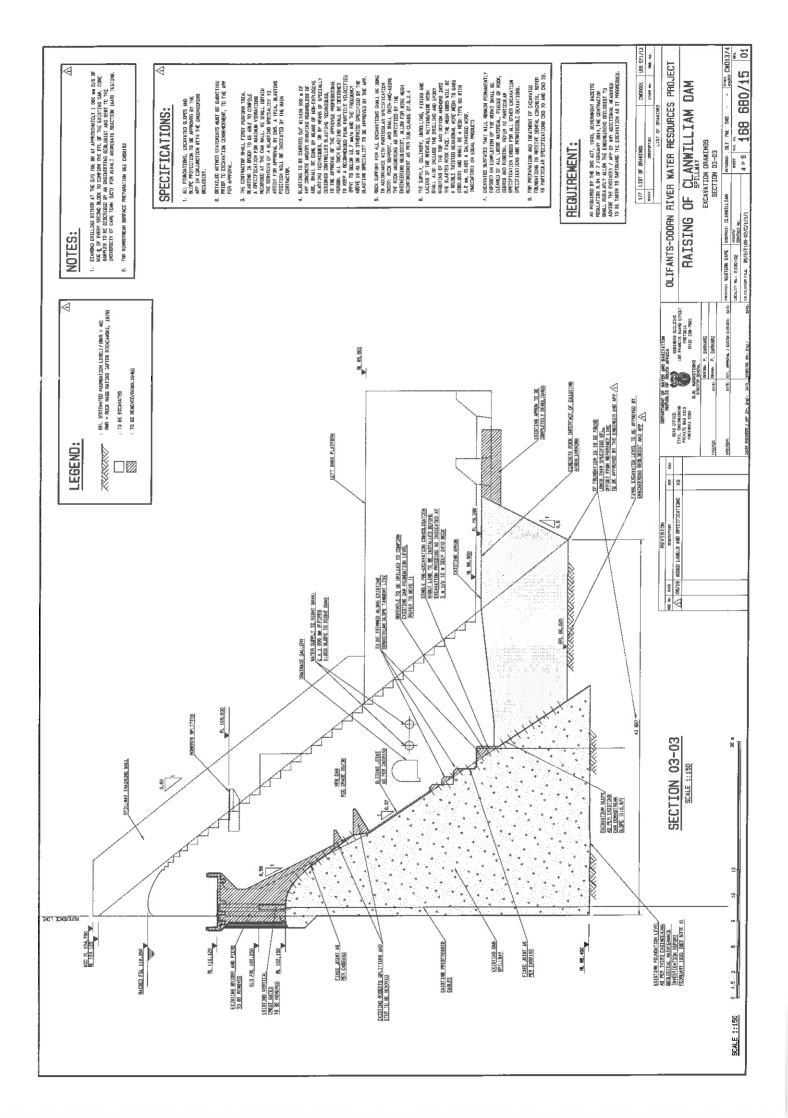


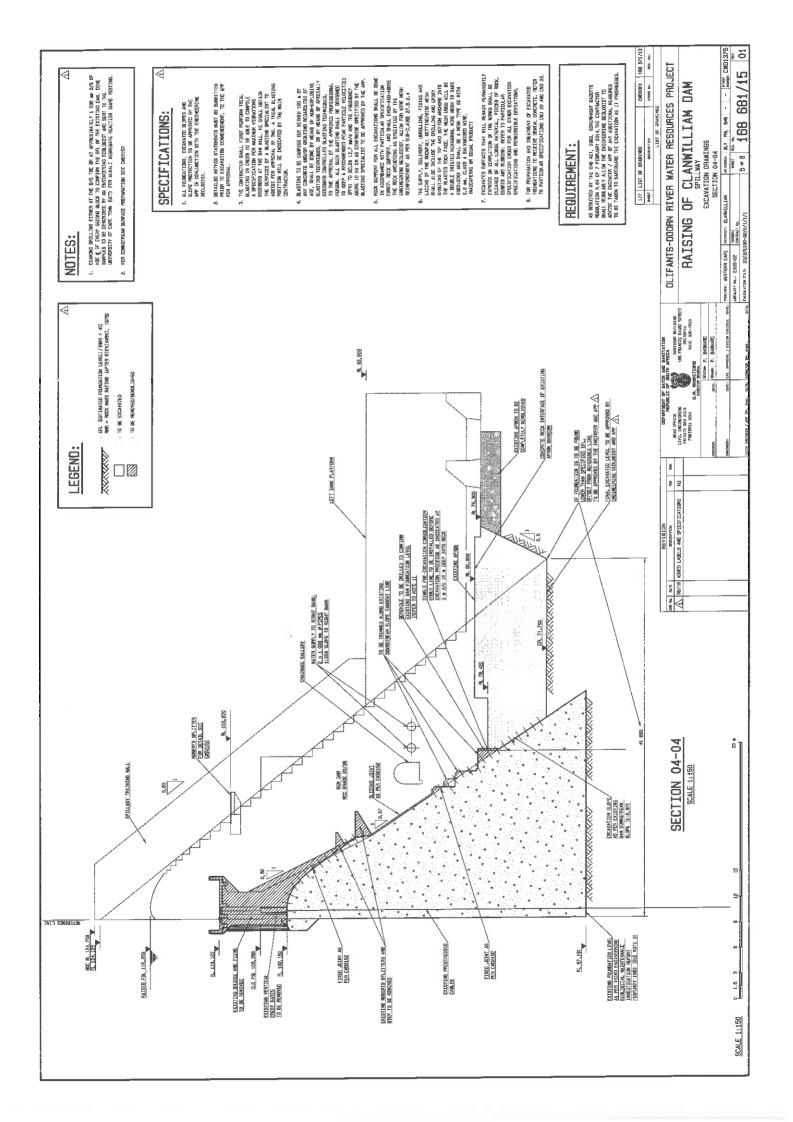


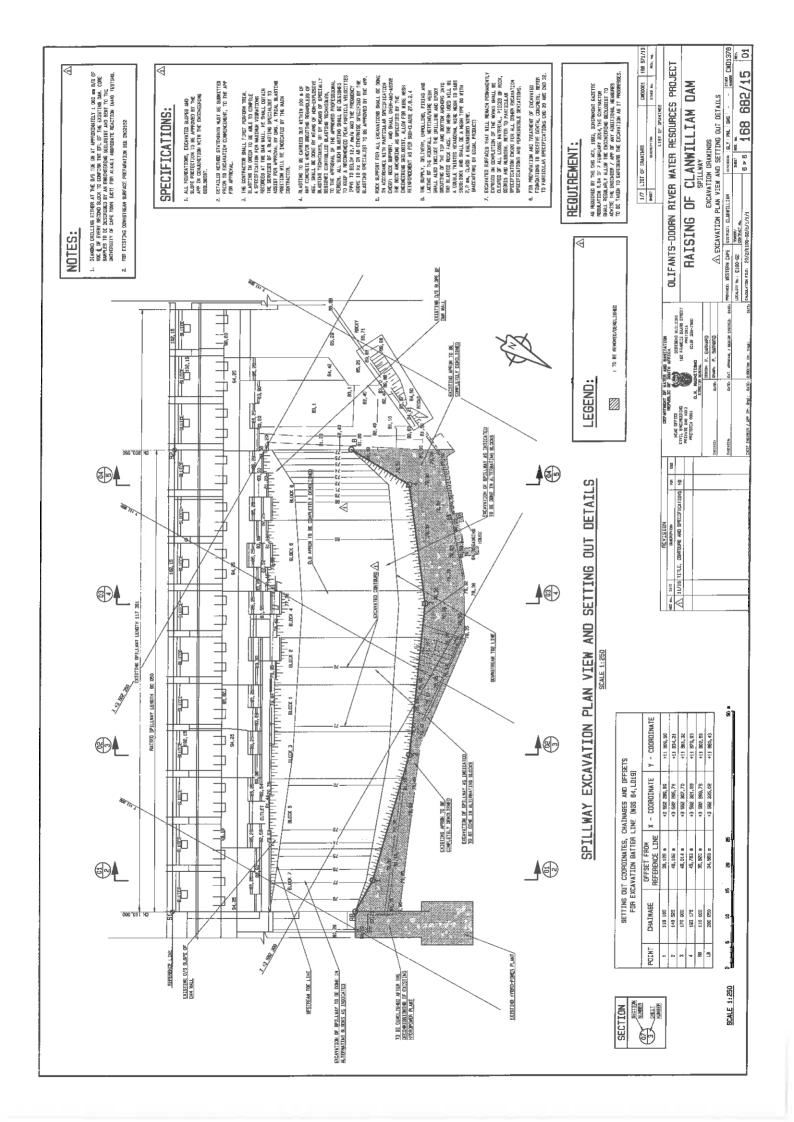












DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

THE DRILLING AND BLASTING FOR DAM FOUNDATION EXCAVATION AND SLOPE PROTECTION FOR THE CLANWILLIAM DAM IN THE WESTERN CAPE PROVINCE

C5. SITE INFORMATION

CONTENTS

C5.1 FIRST ENGINEERING GEOLOGY REPORT

C5.1 FIRST ENGINEERING GEOLOGY REPORT

The document will be handed out as a CD at the compulsory site meeting.

The information and interpretations made in the above mentioned First Engineering Geological Report for Design are provided to assist bidders. No responsibility, for the accuracy of any information contained in this report, is accepted by the Employer. No subsequent claims made by the Contractor for losses or additional costs caused by information contained in the above report or any interpretation thereof will be considered by the Engineer.

DEPARTMENT OF WATER AND SANITATION

DWS06-0419 (WTE)

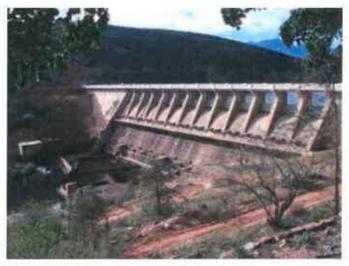
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C6. Environmental Management Program

The following document are the Environmental Management Plan:

- REVISED ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE STRENGHTENING AND RAISING OF CLANWILLIAM DAM
- Approval of the Environmental Management Program (EMP) in terms of the Record of Decision for the Strengthening and Raising of the Clanwilliam Dam and associated re-alignment of certain Secondary Roads

The information and interpretations made in the above mentioned documents is there to assist bidders to adhere to the EMP for the project. No subsequent claims made by the Contractor for losses or additional costs caused by information contained in the above report or any interpretation thereof will be considered by the Engineer.



REVISED ENVIRONMENTAL

MANAGEMENT PROGRAMME FOR

THE STRENGHTENING AND RAISING

OF CLANWILLIAM DAM

Report No: 13086-46-Rep-001-EMP

REV 0



REPARED BY:

TLOU INTEGRATED TECH

PO BOX 12859 HATFIELD 0028

TEL: (012) 343 7120 FAX: (012) 343 7132

C L A N W I L L I A M D A M E

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OLIFANTS-DORING RIVERS THE STRENGHTENING AND RISING OF CLANWILLIAM DAM

ENVIRONMENTAL MANAGEMENT PROGRAMME

Revision 0

October 2014



PROJECT DETAILS Title: Revised EMPr for the Strengthening and Raising of Clanwillian Dam Client: Department of Water and Sanitation Private bag x 313 Pretoria 0001 WP 0895 WTE Project number: October 2014 Date: Authors: Isabel Radebe (Pr Tech Eng & Post Grad) (Tiou Integrated Tech cc) Dr Mathys Vosloo (Phd.D Zoology & Registered Pr Science) (Zitholele Environmental Consulting) Approved on behalf of TLou Integrated Tech cc: SL Kekana Pr Tech Eng & Post Grad. Project Leader Approved on behalf of the **Department of Water and Sanitations**:

Mark Anthony-Williams
Infrastructure Management Services - Chief Director

Document Control Record and Inputs

Revision	Consultations	Department	Dates	Description
	Mark Anthony-Williams	DWS		
	Mishelle Govender	DWS		
	Levy Kekana	PSP		
	Isabel Radebe	PSP		
1	Dr Mathys Vosloo	PSP	October 2014	Rev 1
	Shandre Laven	PSP		
	Harry Swart	DWS		
	Johannes Van Zyl	DWS		
	Wouter Fourie	PSP		

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LIST OF ACROYNYMS

Acronym	Description
CA	Competent Authority
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme in terms of the NEMA
EMPr	Environmental Management Programme in terms of the MPRDA
HIA	Heritage Impact Assessment
MPRDA	Mineral Petroleum Resources Development Act (28 of 2002) as amended
NEMA	National Environmental Management Act (107 of 1998) as amended
NWA	National Water Act (36 of 1998) as amended
S&EIR	Scoping and Environmental Impact Reporting
BPEO	Best Practicable Environmental Option
I&AP	Interested and Affect Party

GLOSSARY OF TERMS

Term	Description
Best Practicable Environmental	Best Practicable Environmental Option means the option that provides the most benefit or causes the least damage to the environment as a whole at a cost
Option	acceptable to society in the long term as well as in the short term. Environment means the surroundings within which humans exist and that are
	made up of – (i) the land, water and atmosphere of the earth;
Environment	(ii) micro-organisms, plant and animal life;
	(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
	(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
	Pollution means any change in the environment caused by - (i) substances;
	(ii) radioactive or other waves; or
	(iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or
Pollution	substances, construction and the provision of services, whether engaged in by
	any person or an organ of state, where that change has an adverse effect on
	human health or well-being or on the composition, resilience and productivity of
	natural or managed ecosystems, or on materials useful to people, or will have
	such an effect in the future.
Environmental Aspect	Element of an organization's activities or products or services that can interact with the environment.
Environmental	Any change to the environment, whether adverse or beneficial, wholly or
Impact	partially resulting from an organization's environmental aspects.
	Interested and Affected Party for the purposes of Chapter 5 of the NEMA and in
	relation to the assessment of the environmental impact of a listed activity or
Interested and	related activity, means an interested and affected party contemplated in Section 24(4)(a)(v) of the NEMA and which includes -
Affected Party	a) Any person, group of persons or organisation interested in or affected by
Allociou i arty	such operation or activity; and
	b) Any organ of stale that may have jurisdiction over any aspect of the operation or activity.
	Individual responsible for the planning, management, coordination or review of
Environmental	Environmental Impact Assessments, Strategic Environmental Assessments,
Assessment Practitioner	Environmental Management Programmes or any other appropriate
FIACHUOIIEI	environmental instruments introduced through regulations.

1 Introduction

The Department of Water and Sanitation (DWS) (previous Department of Water Affairs) intend to proceed with the implementation of the Strengthening and Raising of the existing Clanwilliam Dam and associated re-alignment of certain secondary roads Project (hereafter referred to as the proposed project). The mandatory Environmental Authorisation Process for the proposed project was concluded with the granting of Environmental Authorisation by the Western Cape Department of Environmental Affairs and Development Planning (WCDEADP). The proposed project was prompted by the opportunity to increase the water-yield of the existing Clanwilliam Dam brought by the necessity to conform with the dam safety requirements stipulated in Chapter 12, Section 123 of the National Water Act (36 of 1998) (NWA) and regulations thereunder. The projected marginal cost of raising over and above the cost of strengthening the dam wall, is such that the raising is considered as economically viable, socially desirable and environmentally acceptable.

The Clanwilliam Dam is an existing impoundment structure (see Figure 1) and was constructed in 1935 prior to the coming into effect of the National Environmental Management Act (107 of 1998) (NEMA), the NWA as well as Specific Environmental Management Acts such as the National Environmental Management: Waste Act (59 of 2008) (NEMWA). Structural changes made to the Clanwilliam Dam to date include raising the dam wall with the addition of 13 crest gates and through the use of pre-stressed cables. The Clanwilliam Dam wall is 43 meters high and the dam has a storage capacity of 124 million m³ which will be increased to 362 million m³ with the proposed raising of the dam



Figure 1: View of existing Clanwilliam Dam Wall from western bank

wall.

The activities required for the Strengthening and Raising of the existing Clanwilliam Dam and associated re-alignment of certain secondary roads fall within the ambit of the National Environmental Management Act (107 of 1998) and as such require Environmental Authorisation (EA) before the activities can proceed. The Environmental Impact Assessment carried out for the proposed project was initiated during November 2004, prior to promulgation of the NEMA Environmental Impact Assessment Regulations 2010, as such the EIA Process for the proposed project was carried out in accordance with the EIA regulations (R.11831) promulgated in in terms of the Environment Conservation Act (73 of 1989) (ECA). Environmental Authorisation for the proposed project was granted by the WCDEADP on 22 February 2010, allowing the proposed project to be implemented. Prior to the implementation of the Construction Phase a number of conditions provided in the Environmental Authorisation must be met including revising the DWS' generic Environmental Management Programme to ensure that the document is project specific all that EA Conditions are incorporated. The revision and amendment of the EMPr for the proposed project will ensure that the management measures provided in the document are adapted to suit the project specific conditions and nature of the receiving environment.

1.1 Purpose of the Environmental Management Programme

The application of the EIA Process, for the proposed project, served as a pre-decision making Environmental Management Tool for determining and evaluating the significance of the environmental consequences that the implementation of the project activities. The environmental consequences (i.e. environmental impacts) and mitigation measures formulated to manage these impacts informed the conditions provided in the EA and consideration of the Application by the WCDEADP. Managing the environmental consequences through preventing or reducing the significance thereof lies in the implementation of the mitigation measures.

The mitigation measures provided in the Environmental Impact Report (titled "Proposed raising of Clanwilliam Dam and associated realignment of affected roads Final

¹ Environment Conservation Act (73 of 1989) Regulations regarding activities identified under Section 21(1). 1997. (Notice 1183). *Government gazette*. 8261:1, 5 Sept.

Environmental Impact Report") dated September 2007, have been translated into enforceable EA Conditions and have been incorporated into this EMPr. This document serves as the Revised EMPr for the proposed Strengthening and Raising of the existing Clanwilliam Dam and associated re-alignment of certain secondary roads Project. Furthermore the EMPr is intended to achieve the following primary objectives:

12

- Conform to the information requirements stipulated in Regulation 33 of the NEMA EIA Regulations 2010 (Government Notice R.543)
- Ensure that environmental management practices are tailored to the site specific conditions are implemented throughout the project lifecycle;
- Ensure that the conditions provided in the EA are translated into management actions, and to report on the measures that have been taken to comply with the EA Conditions;
- Conform to Condition 23 of the Environmental Authorisation issued by the WCDEADP for the proposed project; and
- Ensure that all reasonable measures are taken to prevent the realisation of adverse environmental consequences that be prevented with the implementation of mitigation measures.

Particulars of the Environmental Assessment Practitioner 1.2

In keeping with the requirements of Condition 23 of the Environmental Authorisation granted by the WCDEADP for the proposed project, Tlou Integrated Tech (referred to as "Tlou") were appointed by the DWS to update and refine the DWS' Generic Environmental Management Plan which was submitted with the initial EIA Application. In its team, Tlou has included a professional team members from Zitholele Environmental Consulting to look at specialist component of the project. The overall details and competencies of the project team members who contributed to and were instrumental in preparing this EMPr is provided in Table 1.

Table 1-1: Details of Project Team Members

Team Member	General responsibilities	Qualifications	Core competencies under this framework appointment
Isabel Radebe	Professional Staff – Project management	Registered Pr Tech Eng and Post Grad. Dipl in Business Management from University of Johannesburg and University of Natal.	EIA Project Manager, Review of deliverables, EIA Project and financial management, Client Liaison, EIA reporting, Management of specialists.
Dr Mathys Vosloo	Professional Staff - Environmental Assessment Practitioner	Ph.D Zoology (Nelson Mandela Metropolitan University, 2012). SACNASP, Pr Sci.Nat registered	EIA Project Manager, Review of deliverables, EIA Project and financial management, Management of GIS, Client Liaison, EIA reporting, Management of specialists, Technical mentoring, Management of statutory processes and risk assessment
Mrs Shandré Laven	Professional Staff - Environmental Assessment Practitioner	BSc Homs. – Environmental Science (North West University, 2009). SACNASP, Cand.Sci.Nat. registered	

All existing feasibility, preliminary design, Ecological Water Requirements (EWR), and EIA documents was used to prepare the EMPr. These documents were provided by project proponent upon the appointment of Tlou. The conditions provided in the EA called for the development of mitigation measures aimed at protecting groundwater resources and the appointment of a Heritage Expert to assist with the recording of heritage resources and implementation of mitigation measures.

1.3 Document Roadmap – Rationale for document structure

The regulations promulgated under the ECA which related to EIA did not make any provision for the inclusion or contents of an Environmental Management Plan in the submissions made to the Competent Authority. Although the Environmental Impact Assessment Process for the proposed project was carried out in accordance with the EIA regulations (R.1183) promulgated in in terms of the ECA this EMPr has been structured to conform to the requirements provided in Regulation 33 of the NEMA EIA Regulations 2010.

1.3.1 Content of EMPr – Regulation 33 of NEMA EIA Regulations 2010

Specific provisions which are included in Regulation 33 of the Environmental Impact Assessment (EIA) Regulations 2010 (R.543²) relating to the contents of an EMPr is provided in Table 1-2. It should be noted that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. Non-compliance to environmental law is a criminal offence and if prosecuted Eskom will be liable for any environmental damage incurred.

Table 1-2: Document Roadmap

	DOCUMENT ROADMAP		
Regulation 33 of the EIA Regulations (2010)	Description of Regulation	Relevant chapter of document	
Regulation 33(a)	details of – (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Part 1.2	
Regulation 33(b)	information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of— (i) planning and design; (ii) pre-construction and construction activities; (iii) operation or undertaking of the activity; (iv) rehabilitation of the environment; and (v) closure, where relevant.	Part 6	
Regulation 33(c)	a detailed description of the aspects of the activity that are covered by the draft environmental management programme;	Part 6	
Regulation 33(d)	an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Part 4	
	proposed mechanisms for monitoring compliance with	Part 7	
Regulation 33(e)	and performance assessment against the environmental management programme and reporting thereon;	Part 8	
Regulation 33(f)	as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;	Part 6.17	

² South Africa. 2010. National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulations, 2010. (Notice 543). Government gazette 33306:3, 18 June

	DOCUMENT ROADMAP		
Regulation 33 of the EIA Regulations (2010)	Description of Regulation	Relevant chapter of document	
Regulation 33g)	a description of the manner in which it intends to— (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; (iii) comply with any prescribed environmental management standards or practices; (iv) comply with any applicable provisions of the Act regarding closure, where applicable; (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Part 8	
	time periods within which the measures contemplated in	Part 6	
Regulation 33(h)	the environmental management programme must be	Part 7	
	implemented;	Part 8	
Regulation 33(i)	the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;	Part 8.5	
Regulation 33(j)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;	Part 8.1	
Regulation 33(k)	Where appropriate closure plans including closure		

1.3.2 Incorporation of EA Conditions

Where the management and mitigation measures provided in this EMPr serves to conform and respond to a specific condition provided in the EA, it will be indicated as such.

2 Project Description

2.1 Project Background and Description

The Clanwilliam Dam was built in 1935 and is situated on the Olifants River adjacent to the N7 in close proximity to the town of Clanwilliam in the Western Cape Province of the Republic of South Africa. Dam safety investigation concluded that the Clanwilliam Dam requires remedial work for dam safety reasons. Specific concerns are related to the prestressed cables having lost their shear resistance ability and there also being problems with alkali-aggregate reaction. As a result, the hazard and risk levels for the dam fall within an unacceptable range according to current DWS standards.

The Department of Water Affairs has received a conditional Environmental Authorisation for the raising of the existing Clanwilliam Dam by 15 m from 43 m to 58 m on 12 May 2009. The Environmental Authorisation for the dam raising requires that a comprehensive and detailed Environmental Management Programme for minimising and mitigating impacts be compiled and approved prior to the start of construction.

The proposed strengthening and raising of the Clanwilliam Dam Wall will entail the following overarching project activities:

- The strengthening of the dam wall by the addition of a concrete apron on the downstream face of the wall and adding additional concrete on the crest and downstream face;
- Raising the dam wall height from 43 meters to 58 meters, thereby increasing of the net storage volume of the Clanwilliam Dam with 240 million m3/a;
- Upgrading the dam to accommodate the reserve release requirements, which will include
 the construction of a multi-level intake structure on the upstream face of the dam wall,
 which will include drilling and cutting through the existing dam wall, accommodating the
 existing mini-hydropower station, and the construction of a new stilling basin for the
 outlets on the downstream side of the dam.

The raising of the Clanwilliam Dam Wall will necessitate roadworks relating to the realignment of the existing gravel access road on the eastern side of the dam as well as portions of the divisional and minor roads. The following roadworks associated with the proposed project will be carried out:

 To allow access to the raised Clanwilliam Dam Wall crest and outlet works, existing gravel access road located on the eastern side of the dam will be realigned;

- Realignment and raising, and possible closure, of portions of the gravel road between Clanwilliam and Citrusdal (Divisional Road DR2183) including the construction of a large culvert and bridge;
- Raising portions of the road between the N7 and Algeria (Divisional Road DR1487 / Minor Road MR539) including the construction of a bridge to replace the existing causeway over the Oliphant's River;
- Raising portions of the Citrusdal Road (Minor Road MR539) including the construction of a culvert to lift portions of the road; and
- Raising and realignment as well as the possible closure, of portions of the Renbaan Road (Minor Road MR16/2) including the construction of a large culvert.

Lastly, the proposed remedial work and possible raising of the dam would require numerous construction related activities which include, inter alia:

- The establishment of a construction camp (basic infrastructural services, sewerage and wastewater treatment, roads and storm water drainage, and erection of temporary or permanent housing).
- The establishment of a construction site (basic infrastructural services such as water and electrical reticulation, sewerage and wastewater treatment, roads and storm water drainage, administration offices, workshops, material storage areas).
- The construction of a permanent gravel road on the eastern side of the dam to provide access.
- The extension of the existing quarry to source and stockpile construction material

The maintenance and management of South Africa's National Road Network falls within the ambit of the SANRAL³. A separate EA Process for the realignment and raising of portions of the N7 to accommodate the raised Clanwilliam Dam Wall. EA was granted by the WCDEADP allowing the following project activities to proceed:

- Realignment of the portion of the N7 National Road between km 89.32 and km 95.92; and
- Raising of the portion of the N7 National Road between km 68.77 and km 70.22.

³ SANRAL: South African National Roads Agency Limited

2.2 Project Activities and Phasing

Due to the long nature of the proposed construction activities associated with the raising of the Clanwilliam Dam, it is proposed to consider construction activities in a phased approach, thus allowing sufficient time for compliance with pre-construction conditions stipulated in the environmental authorisation (EA) dated 12 May 2009. The phased approach including proposed construction timeframes and pre-construction conditions stipulated in the EA are presented in the Table 2-1 below.

Table 2-1: Phased approach to construction activities for the Clanwilliam Dam raising project.

Construction site establishment		The establishment of a construction camp (Batching plant, silos, laydown areas, offices) The establishment of a construction site The construction of a permanent gravel road The extension of the existing quarry	Area west of the existing quarry and N7 road Immediately downstream of dam wall Eastern side of dam Existing quarry horation	November 2014 to April		
		ent of a construction site n of a permanent gravel road of the existing quarry	Immediately downstream of dam wall Eastern side of dam Existing quarry	November 2014 to April		
	The construction The extension of	n of a permanent gravel road of the existing quarry	Eastern side of dam banksteing quarry location	2015 (6	Conditions 3, 4, 11, 14, 22, 23, 23.13, 24	1 December 2014
	The extension of	of the existing quarry	Existing quarry	Months)		
	Construction of 1		100000			
		Construction of temporary access roads	West of dam from construction camp to dam wall			
_	Clearing of the foundation	Clearing of the foundation footprint in the river and on the valley flanks				
		Demolition of various components of the existing dam		February 2015 to	Conditions 6, 8, 16, 19.	
2 and raising or	or Excavations		Within 100m	December	20, 21, 27	15 January 2015
Maii Wali	Infilling and cut-off grouti foundation	-off grouting below the new	radius from dam wall	months)		
	Drilling and blast valley flanks bek	Drilling and blasting o drainage addits into the valley flanks below the raised dam				
	Cutting of openi	Cutting of openings through the existing dam				
	Erection of form	Erection of form work and casting of concrete				
Raising,	Portions of the g	Portions of the gravel road between Clanwilliam	Existing road	January		01 November
3 realignment and/or		and Citrusdal (Divisional Road DR 2183) including construction a large culvert and bridge	alignments, area between existing	2018 - October	Conditions 9, 15	2017

	Phase	Construction activities	Impact area	Phase timing	Pre-construction conditions from RoD to comply with	Pre-construction conditions deadline
dec	decommissioning of existing provincial and minor roads	Raising of portions of the road between the N7 and Algeria (Divisional Road DR 1487 / Minor Road MR 539) including constructing a bridge to replace the causeway over the Oliphants River Raising of portions of the Citrusdal Road (Minor Road MR 539) including constructing a culvert to lift portions of the road Raising and re-alignment, and possible closure, of portions of the Renbaan Road (Minor Road MR 16/2) including constructing a large culvert	dam level to new dam purchase line	2018 (10 months)		
Rai wa dai inu	Raising of the water level in the dam and inundation of new area	Dam level rises causing inundation of the area below the purchase line.	(#)	Post October 2018	Conditions 10	30 September 2018

2.3 **Design Considerations**

2.3.1 Existing structure

Clanwilliam Dam is a concrete gravity dam with a non-overspill crest (NOC) length of approximately 250 m. The spillway section is 117.5 m long and has an approximated ogee shape. Spillway discharge is controlled with 13 vertical spillway gates. The gates are used to provide additional storage above the spillway invert level. Piers support the gates and deck over the spillway, resulting in an effective spillway length of 101 m. The full supply level (FSL) of the dam is at RL 105.25 m and the crest of the ogee at RL 102.20 m. Two outlet pipes of nominal diameter (φ) 1 219 mm discharges into the river. Their inlets are at RL 80.51 m. Discharge is controlled with sleeve valves. The maximum discharge capacity is approximately 10 m³/s. An additional outlet pipe delivers water to the hydropower plant, which is currently dysfunctional, and the irrigation canal on the downstream right flank.

The existing outlet works comprise of two 1219 mm pipes (RL 79,55) and two 914 mm pipes (RL 81,99). Both 1219 mm pipes are located within the spillway section, with one being just left of the existing outlet chamber and the other towards the middle of the spillway. Releases to the river are undertaken through these pipes.

2.3.2 Design philosophy

The design philosophy for the Clanwilliam Dam raising project centres on achieving the following aspects:

- Long-term structural reliability;
- Minimal operational requirements / predictable operation;
- Minimal maintenance requirements; and
- The budget for the project should be acceptable to the sponsor:

2.3.3 Availability of material

Results from geotechnical investigations indicate that adequate aggregate is available for the proposed raising by roller compacted concrete (RCC). RCC is the preferred material mainly due to the rapid tempo at which it can be placed, resulting in shorter construction periods and its relatively low heat of hydration. For the purposes of this report the design was based on the use of RCC. The eventual choice of spillway type and construction programme may dictate the use of mass concrete.

2.3.4 Dam wall structure considerations

The proposed dam wall structure is recommended to have the following characteristics:

- Construction of a concrete apron on the downstream face of the existing structure
- Additional concrete on the crest and downstream face of the existing structure;
- Raising the dam wall height from 43 meters to 58 meters
- Construction of a multi-level intake structure on the upstream face of the dam wall
- Drilling and cutting through the existing dam wall
- Construction of a new stilling basin for the outlets on the downstream side of the dam.

2.3.5 Non-Overspill Crests (NOC's)

It is recommended that NOC's are raised vertically including the addition of waterproof concrete balustrades or parapet walls. This will add to the storage height of the structure. Both the left and right NOC's are assumed to be 4,5 m wide. The crest levels of the NOC's are assumed to be at the maximum water levels. This means that a 0 m freeboard is accepted during the Safety Evaluation Flood.

2.3.6 New outlet works

The new outlet works will comprise of a combination of 1200 mm pipes and 900 mm pipes. The 900 mm pipes will be used to extend the existing 914 mm pipes. All other pipes will have a diameter of 1200 mm. Discharging shall be done by means of 900 mm sleeve valves for the 1200 mm pipes, and 600 mm sleeve valves for the 900 mm pipes. The combination and quantity of valves shall depend on the required discharge capacity of the outlet works.

2.4 Potential impacts resulting from the raising of the dam

The following impacts may affect the bio-physical and social environments within the study area.

2.4.1 Operational phase impacts

- Impact on flora;
- Impact on terrestrial fauna;
- Impact of reservoir-induced seismicity;
- Impact on ability to achieve recommended scenario for EWRs
- Impact on Riverine Fish; and
- Impact on groundwater resources.
- Visual impacts;
- Impact on heritage resources;

- Impact of inundation of roads on access.
- Impact of inundation of existing infrastructure, other than roads
- Impact of loss of agricultural land on livelihood security
- Impact on assurance of supply to farmers
- Impact of increased water yield on Resource Poor Farmers
- Impact on the local economy
- Macro-economic impacts

2.4.2 Construction phase impacts

- Disturbance of flora
- Disturbance of fauna
- Sedimentation and erosion
- Deterioration of water quality
- Traffic impacts
- Interruption of water releases
- Storage and utilisation of hazardous substances on site
- Risk of fire
- Creation of employment opportunities
- Influx of workers to the area (health and safety risks)
- Influx of job seekers
- Creation of business opportunities for local businesses
- Disturbance to sense of place, visual aesthetics
- Windblown dust
- Litter/ waste pollution
- Noise pollution
- Light pollution
- Impact of sourcing construction material

3 Environmental Legislative Requirements

3.1 Framework Legislation

All environmental and applicable legislation, as well as other requirements will be complied with during the course of implementation of this project. Any changes in legislation, or other requirements, will be updated as and when required and communicated to all role-players involved in the project. A list of applicable legislation is provided in Table 3-1 below.

Table 3-1: List of applicable legislation for the raising of the Clanwilliam Dam wall

No	Legislation
1	Advertising on Roads and Ribbon Developments Act, Act 21 of 1940
2	Conservation and Agricultural Resources Act, Act 43 of 1983 (CARA)
3	Constitution of the Republic of South Africa Act, Act 108 of 1996
4	Development Facilitation Act, Act 67 of 1995
5	Environment Conservation Act, Act 73 of 1989
6	Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947
7	Hazardous Substances Act, Act 15 of 1973
8	Intergovernmental Relations Framework Act, Act 13 of 2005
9	Mineral and Petroleum Resources Development Act, Act 28 of 2002
10	Mountain Catchment Area Act, Act 63 of 1970
11	Municipal Structures Act, Act 117 of 1998
12	Municipal Systems Act, Act 32 of 2000
13	National Building Regulations and Building Standards Act, Act 103 of 1977
14	National Building Regulations and Building Standards Amendment Act, Act 30 of 1982
15	National Building Regulations and Building Standards Amendment Act, Act 36 of 1984
16	National Environmental Management Act, Act 107 of 1998 (NEMA)
17	National Environmental Management: Air Quality Act, Act 39 of 2004
18	National Environmental Management: Biodiversity Act, Act 10 of 2004
19	National Environmental Management: Protected Areas Act, Act 57 of 2003
20	National Environmental Management: Waste Act, Act 59 of 2008
21	National Forest Act, Act 84 of 1998
22	National Forest and Fire Laws Amendment Act, Act 12 of 2001
23	National Heritage Resources Act, Act 25 of 1999
24	National Road Traffic Act, Act 93 of 1996
25	National Veld and Forest Fire Act, Act 101 of 1998
26	National Water Act, Act 36 of 1998
27	Occupational Health and Safety Amendment Act, Act 181 of 1993
28	Promotion of Access to Information Act, Act 2 of 2000
29	Promotion of Administrative Justice Act (PAJA), Act 3 of 2000
30	Protected Disclosure Act, Act 26 of 2000

No	Legislation
31	Provincial Nature Conservation Ordinances
32	Public Finance Management Act, Act 1 of 1999
33	Traditional Leadership and Governance Framework Amendment Act, Act 41 of 2003
34	White Paper on Environmental Management
35	White Paper On Integrated Pollution and Waste Management For South Africa
36	White Paper on Land
37	White Paper on the Conservation and Sustainable use of South Africa's Biodiversity

3.2 Environmental principles

The following principles should be considered at all times during all phases of the proposed dam raising activities.

- The environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities (i.e. the footprint of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle "waste" material.
- The proponent shall exercise the "Duty of Care" principle at all times during the life of the dam raising project.
- The proponent shall also prescribe to the "Polluter Pays" principle and shall manage the project in a pro-active manner to avoid any incidents of pollution.

3.3 Licences and Permits Requirements

A number of permits and licences are generally required for projects of this nature before construction can commence. A list of such permits or licences is provided in Table 3-2 below.

Table 3-2: List of possible permits or licences that may be applicable

Permit / Licence	Relevant legislation / Regulating authority
Blasting	Blasting permits are required from the Department of Mineral Resources in accordance with the Explosives Act (Act No 26 of 1956).
Waste disposal	All wastes (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites. Government Notice (GN) 921, promulgated in terms of the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA), lists Waste Management Activities in respect of which a waste management licence is required; these include various activities associated with the storage of waste, reuse, recycling and recovery of waste, treatment of waste (which includes the remediation of contaminated land) and disposal of waste. NEMWA GN 926 presents the norms and standards for the storage of waste. The Department of Environmental Affairs is the regulating authority for waste management activities.
Storage of hazardous substances	Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act, the Occupational Health and Safety Act, and relevant associated Regulations.
Health and safety of work teams	Construction Regulations (2003) published under the Occupational Health and Safety Act (Act No 85 of 1993) apply to construction activities including "the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work". A "health and safety plan" which addresses hazards, and includes safe working procedures to mitigate, reduce or control the hazards identified, is required under this Act. A risk assessment must also be undertaken by an appropriately qualified person(s) and the Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences
Heritage resources	Before any heritage resources are demolished or damaged a permit should be obtained prior to any actions been taken. Permit applications must be submitted to South African Heritage Resources Agency (SAHRA).
Removal of trees	The removal of trees from the dam basin requires a permit in terms of the National Forest Act (No 84 of 1998).
Removal and transportation of endangered fauna and flora	A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous protected and endangered plant and animal species. Copies of permits required must be submitted to the DEA for record keeping purposes.
Water abstractions	Water abstracted from any sources for construction purposes requires authorisation in terms of the National Water Act, No 36 of 1998.
Removal of graves	Permits are required for the removal of graves in terms of the National Heritage Resources Act (No 25 of 1999) section 36.
Asphalt Plants	GN 893 of 2013 in GG 37054 dated 22 November 2013 provides a list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Activities include Macadam preparation (the mixing of aggregate and tar or bitumen to produce road surfacing in permanent facilities and mobile plants). These activities require an Atmospheric Emission Licence in terms of Section 37 of the Act.
Borrow areas and Quarries	Government Gazette No 26501 dated July 2004 states that the Minister of the Mineral Resources, acting in terms of section 106 (1) of the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA) exempts the Department of Water Affairs, amongst other institutions, from the provisions of sections 16, 20, 22 and 27 of said Act in respect of any activity to remove any mineral for the construction and maintenance of dams, harbours, roads and railway lines and for purposes incidental thereto. Section 106 (2) of the MPRDA says that in such cases the

Permit / Licence	Relevant legislation / Regulating authority
	DWA must still compile an Environmental Management Programme (EMP) for approval in terms of Section 39 (4) of the Act.

4 Structure and responsibility for environmental management

4.1 Implementation of Environmental Management Programme

The implementation of the mitigation, environmental management and EA conditions documented in this EMPr requires the commitment of various stakeholders and role players. Although the onus of ensuring that all project activities associated with the proposed project comply with mitigation, environmental management and EA conditions rest with the holder of the EA, various parties will play a role in the implementation of this EMPr. Taking the aforementioned into account, this section of the EMPr is intended to clearly define the responsibilities for management actions contained in this document and to explain arrangements for coordination among the role players involved in the implementation of the proposed project lifecycle.

4.2 Regulating / Commenting Authority

In accordance with Section 31 of the National Environmental Management Amendment Act (62 of 2009), the Competent Authority (DEA) is responsible for the application and enforcement of the NEMA as amended and Specific Environmental Management Acts. Concerning the implementation of this EMPr the specific role of the Competent Authority will entail the following:

- Review the revised EMPr submission and based on the review, approve the EMPr (with or without conditions) or request amendments to be made to the document as well as the resubmission thereof;
- Review all monitoring and audit reports submitted by the ECO and advise of any additional corrective measures to be implemented;
- Conduct routine inspections at any reasonable time with the intend to determine compliance with the EMPr, EA Conditions and Method Statements; and
- In instances where required assist the Project Proponent in understanding and meeting the specified conditions provided in the EA.

4.3 Roles of Key Stakeholders

4.3.1 Project Proponent

The project proponent (holder of the EA) namely the DWS is required to ensure that all conditions provided in the EA, as well as any other reasonable condition that the Competent Authority (DEA) considers necessary for the protection of the environment, are met. In keeping with the requirements of Section 28 of the NEMA as amended, the holder of the EA is also required to take all reasonable measures and to implement mitigation / management measures to prevent adverse environmental consequences, associated with the implementation of the project activities, from happening.

29

The project proponent is responsible for ensuring that the mitigation measures provided in this EMPr are implemented and that the mitigation measures are clearly understood by all relevant parties. Where the implementation of Construction and / or Operational activities associated with the proposed project are contracted out (e.g. to Contractors and / or Subcontractors), the legal responsibility associated with non-compliance still rests with the Project Proponent (unless otherwise agreed upon by the Competent Authority). The project activities may not commence until such time when all required Environmental Authorisations have been granted by the various Competent Authorities within whose mandate the project activities fall.

Additional responsibilities of the Project Proponent also include the following:

- Ensure compliance with the EA Conditions by any person acting on their behalf, including but not limited to, an agent, sub-contractor, employee or any person rendering a service to the holder of the EA;
- Notify the WCDEADP, ECO any other relevant authority, in writing, within 24 hours thereof if any condition of the EA is not adhered to;
- Ensure that a copy of the EA is kept onsite at all times. The EA must be provided to authorised official of the WCDEADP who requests to see it and must be made available for inspection any employee or agent of the holder of the EA who works or undertakes work within the development footprint;
- Notify the WCDEADP, within 30 days, of any changes of the ownership and / or project developer. It must be explained to the new owner / developer that the conditions provided in the EA are legally binding and must be adhered to;
- Notify the WCDEADP of any change of the contact details including the name of the responsible person, the physical or postal address and / or telephonic details and provide the Department with the new details; and

 Allow Departmental Officials access to the development site for the purpose of assessing and / or monitoring compliance with the EA Conditions.

The project proponent will also be require (as requested by the Competent Authority) to:

- Provide a report which provides details regarding the following:
 - o Extent to which the EA conditions are / not being complied with;
 - o The nature of, and reasons for, any non-compliance with a condition provided in the EA: and
 - Any action taken, or to be taken, to mitigate the effects of any non-compliance or to prevent any recurrence of the non-compliance;
- Environmental Audit Reports on the impacts of the authorised activity on the environment, at specified times or intervals or whenever requested by the competent authority;
- Provide the Competent Authority with proof of compliance with the requirements regarding financial provision for the implementation of the management measures provided in this EMPr.

4.3.2 Engineer

The Project Proponent will appoint an Engineer who will function to ensure that all construction activities are carried out in accordance with the approved detail design for the raising and strengthening of the Clanwilliam Dam and supervision of the contract. In addition the role and responsibility of the Engineer will include:

- Providing assistance to the ECO in the monitoring and execution of the Contractors or Sub-contractors' Method Statements:
- Review and approve the Method Statements developed by the Contractor;
- Maintaining a photographic record of the construction activities
- Verifying that the EMPr have been included in the contract documents;
- Ensuring that Environmental Compliance Matters are addressed during all Site Meetings;
- Provide technical guidance and assistance to onsite teams regarding the implementation and compliance with the EMPr;
- Consults and co-operates with the ECO concerning environmental matters;
- The Engineer may appoint an Engineer's Environmental Representative (EER) to plan and direct the implementation of the EMP and provide advice on environmental matters;
- Conduct regular (weekly) site inspections to determine whether construction activities are carried out as per the detailed design and management measures provided in the EMPr and Method Statements; and
- Provide inputs, as and when required, to the monthly Environmental Compliance Report prepared by the ECO.

4.3.3 Project Manager

The Project Manager, appointed by the DWS will function to coordinate and manage the Construction and Operational Phases of the proposed project. Separate Project Managers for the Construction Phase and Operation Phase may be appointed. Any project activity, which may result in adverse environmental consequences and for which mitigation and management measures are not provided in this EMPr must be approved by the Project Manager. The Project Manager must instruct the Contractor / Sub-contractor to cease any construction activity which is in contravention of this EMPr and the EA.

4.3.4 Contractor and Sub-contractor

Where specific EMPr responsibilities are assigned to Contractors or Sub-contractors, there must be clearly stipulated and included in the contract documentation. Any construction activities or actions of onsite personnel which results in environmental damage, non-compliance with the EA and EMPr, must be reported to the project proponent by the Contractor. The roles and responsibilities of the Contractor will also include the following:

- To prepare Method Statements which sets out the manner in which the management actions contained in an EMPr will be implemented;
- Ensure that all sub-contractors and onsite personnel understand and are familiar with the management measures provided in the EMPr;
- Ensure that all mitigation and management measures relating to construction activities are implemented;
- Report any non-compliance with the EMPr and / or EA Conditions are reported to the project proponent and ECO; and
- Rehabilitate the construction footprint as well as damage to any sensitive environment caused by negligence on the part of the Contractor, to the satisfaction of the ECO.

4.3.5 Environmental Control Officer

The Environmental Control Officer (ECO) will be appointed by the project proponent for the duration of the Construction Phase up to the completion of rehabilitation. In accordance with Condition 24 of the EA, the ECO must be appointed prior to the commencement of any site preparation, land clearing or construction activities. The ECO's primary role will be to monitor compliance with the conditions provided in the EA and the implementation of the EMPr, and to report the compliance / non-compliance to the Competent Authority. The appointed ECO must meet the following requirements:

- Have an appropriate Environmental Management / Science qualification / degree and be registered with a recognised professional affiliation;
- Appropriate training and experience in the implementation of environmental management specifications; and
- Have no vested interest in the proposed project.

The responsibilities of the ECO will include the following:

- Conduct weekly site inspections / audits and record compliance / non-compliance with the management and mitigation measures provided in the EMPr and EA Conditions observed during the inspection;
- Based on the observations made during weekly site inspections issue site instructions to the contractor for any corrective actions which may be required;
- Document the findings of the site inspection / audits against. Monthly Environmental Compliance Audit Reports should be submitted to the Competent Authority. The Environmental Compliance Report should provide an overview of any trends in non-compliance recorded;
- Develop and maintain a !&APs Complaints Register in which all complaints are recorded, as well as remedial action taken and the response provided to the !&APs;
- Verify that the management and mitigation measures provided in the EMPr as well as the EA Conditions have been communicated to, and are understood by all personnel on site including the Contractors and Sub-contractors;
- Report incidents which have lead / may lead to substantial danger to the surrounding communities /public or significant environmental damage, to the Competent Authority.
 Any remediation or corrective measures which have been / proposed to be implemented to prevent danger to the surrounding communities /public or significant environmental damage from occurring must also be reported to the Competent Authority (WCDEADP Appeals Management Unit);
- Ensure that a copy of the approved revised EMPr and EA is kept onsite and accessible to all personnel on site;
- Provide Environmental Awareness Training to all personnel on site, Contractor and Subcontractor. Documented proof of the Environmental Awareness Training as well as the content of the training must be kept onsite and should be made available to the Competent Authority upon request.

4.3.6 Interested and Affected Parties

The role of Interested and Affected Parties will include the following:

- Request updates on the progress of the Construction Phase and the effectives of the EMPr implementation;
- Provide input into corrective actions where appropriate and to the revisions of the EMPr;
- Report any non-conformance with the EA Conditions and EMPr observed to the Competent Authority and ECO; and

 Ensure that the communication platforms provided, such as the Community Consultative Forum are utilised to communicate any queries or concerns relating to the Construction Phase Activities.

4.3.7 Environmental Assessment Practitioner

Within the context of this EMPr and in keeping with the requirements of Condition 23 of the EA the role of the EAP is focussed on updating and refining the DWS' generic EMPr that was submitted to the Competent Authority as an appendix of the final Environmental Impact Report. Although due diligence have been exercised to ensure that the EMPr meets the requirements of the relevant national and provincial standards and guidelines for EIA processes and specialist studies, the EAP is also required to ensure that the EMPr includes the following:

- Submit the revised EMPr, following review of the document by the DWS, to the WCDEADP for review and approval;
- Take into account and be based on the WCDEADP Guideline for Environmental Management Plans (2005);
- Address the mitigation measures provided in the Environmental Impact Assessment Report and the aspects highlighted in the EA;
- Describe the level and type of competency required of the ECO;
- Determine the frequency of site visits to be carried out by the ECO:
- Make provision and call for the inclusion of the revised EMPr in all contract documentation for the Construction Phase of the proposed project;
- Define and allocated roles and responsibilities for all aspects of the EMPr;
- Define the code of conduct for engineers, contractors and sub-contractors, including all other parties operating on the site during construction and include penalties for nonconformance with the EA Conditions;
- Include Environmental Awareness and Training Programmes for all contactors, subcontractors and labourers.

5 Pre-Construction Specifications

- 5.1 Additional submissions to Competent Authority
- 5.1.1 Clanwilliam Dam and Bulshoek Weir Operating Procedures
- 5.1.2 Riverine Monitoring Programme
- 5.1.3 Olifants / Doring Water Management Area Catchment Management Plan
- 5.1.4 Environmental rehabilitation and restoration plan

6 Construction Phase environmental management and mitigation

6.1 Management of Flora

6.1.1 Aspect

Site preparation activities carried out to accommodate the required supporting infrastructure (e.g. concrete batching plants and offices etc.) will necessitate the clearing of vegetation within the footprint of the site camp.

6.1.2 Impact

Vegetation clearing within the development footprint carried out as part of site preparation will result in the loss of indigenous, Red Data Listed species and endangered vegetation types. Areas disturbed by vegetation clearing will create conditions conducive to the establishment of alien / invasive plant species.

6.1.3 Objective

Through the implementation of the management and mitigation measures, the loss of vegetation beyond the demarcated construction area must be prevented.

6.1.4 Target

Eradication of, and prevention of the establishment of alien plants and invasive species. No disturbance to or loss of protected flora species outside of construction footprint.

6.1.5 Management and Mitigation Measures

The implementation of the following management and mitigation measures are intended to prevent or reduce the significance of the anticipated impacts on the flora within the development area:

• All plants within the inundation area which are representative of the local species composition of the area (including bulbs and succulents) should be transplanted into similar soil conditions within the areas disturbed by construction activities. Where no suitable location for transplanting can be identified the removed plants must be used to enrich parts of the Ramskop Nature Reserve at Clanwilliam. Removing the plants, selected for transplantation, from the soil and re-planting it within the identified areas, will

be carried out once prior to the establishment of the site. The mitigation measure will therefore not be carried out repeatedly during the Construction Phase. A level of maintenance and monitoring the growth of the transplanted plants will be required for a minimum of one growing season;

- A plant nursery should be established during the construction phase, for the temporary storage of rescued plants that will used during the Rehabilitation Phase to restore vegetation cover. Maintenance of all rescued plants kept in the nursery will continue for the duration of the Construction Phase up to completion of rehabilitation activities to the satisfaction of the ECO and WCDEADP:
- Vegetation cover should be retained for as long as possible, and vegetation clearance should occur in a phased manner from one side if the site to the other;
- The movement of construction vehicles and the use of equipment should only be permitted on predetermined access routes and predetermined area, respectively, thereby limiting the area disturbance and necessity for the removal of vegetation;
- The removal of vegetation, in particular protected and endangered species outside the construction footprint, or where does not fall within the construction working area will not be permitted;
- All reasonable measures must be taken to control and eradicate any alien invasive species that has been listed in terms of Section 70(1) of the National Environmental Management Biodiversity Act (10 of 2004). The relevant Competent Authority must be notified of the occurrence of any listed invasive species occurring and be provided with an Alien Invasive Control and Management Plan;
- The reseeding of disturbed areas should be carried out at the end of the dry season to ensure optimum conditions for germination and rapid vegetation establishment.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed. All management measures which relate to information being provided to the Competent Authority and the preparation of any additional management plans will be done by the ECO in consultation with the project proponent.

6.1.6 Corresponding Environmental Authorisation Condition

As per <u>Condition 23.13.1</u>, the Environmental Rehabilitation and Restoration Plan must provide details of the approach that will be adopted for "the search for, harvesting of and storage of bulbs, succulents and other suitable horticultural material form areas to be inundated and disturbed that can be used to re-vegetate disturbed areas. The requirement for ongoing alien plant species eradication and management is provided in Condition 23.12.17 of the EA.

6.2 Management of Fauna

6.2.1 Aspect

The increased human presence, movement of workers onsite, operation of equipment and nature of the construction activities (e.g. Drilling and Grouting) will constitute an intrusion in the natural habitat of the fauna found within the development footprint and adjacent areas.

6.2.2 Impact

The movement of workers onsite, operation of equipment and nature of the construction activities (e.g. Drilling and Grouting) may give rise to the following:

- Disturbance to fauna resulting in mobile animals leaving their natural habitat for the duration of the Construction Phase;
- Injury and harm;
- · Obstruction of movement; and
- Preventing access to watering points.

6.2.3 Objective

Through the implementation of the management and mitigation measures, prevent any harm that may be caused to the animal life, by the execution of any construction and / or related activity.

6.2.4 Target

No harm to any animal life resulting from the construction activities.

6.2.5 Management and Mitigation Measures

The implementation of the following management and mitigation measures are intended to prevent or reduce the significance of the anticipated impacts on the animal life within the development area:

- Information provided in the Environmental Awareness Training must lay emphasis on the fact that no intentional harm inflicted on animals will be permitted;
- Any fauna that is found within the construction footprint shall be carefully and safely removed from site to an equivalent environment;

- Snakes or dangerous wildlife that are found within the construction footprint may only be removed from site and relocated by a suitably qualified expert, under the supervision of the ECO;
- The capturing and hunting of any animal as well as the placing of snares will under no circumstances be permitted; and
- No domestic animals will be permitted on site.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed.

6.2.6 Corresponding Environmental Authorisation Condition

Condition 23.12.6 of the Environmental Authorisation explicitly calls for the revised EMPr (this document) to include provisions relating to the implementation of environmental controls and procedures aimed the management and protection of fauna.

6.3 Consultation and Public Relations, and Socio-Economic Environment

6.3.1 Aspect

The increase in areas of inundation is likely to result in the loss of land, built structures and infrastructure. The social dynamic of nearby town including the town of Ebenheaser may be altered by the influx of speculative job seekers employment during the Construction Phase.

6.3.2 Impact

The influx of job seekers from surrounding areas may give rise to the following:

- Limited available land and resources as well as the additional pressure placed on basic service delivery may aggravate social unrest;
- Sexual exploitation of women and the rate of HIV infections may increase.

6.3.3 Objective

Ensure that a system which provides a platform for Interested and Affected Parties (I&APs) to raise any concerns and queries relating to the Construction and associated activities is developed and put in place. The implementation of the communication system will facilitate

maintaining clear lines of communication between I&APs and the role players that are defined in Section 4 of this EMPr.

6.3.4 Target

The following targets will be indicative of whether the set environmental objective has been reached:

- Provide I&APs with regular formal updates on the milestones reached with regards to the
 construction activities. The aforementioned updates should be provided in the form of a
 newsletter or be conveyed in formal written correspondence to the Community
 Consultative Forum;
- Acknowledge and respond to all complaints recorded in the Complaints and Comments Register within 7 working days; and
- Timeously inform I&APs of any disruptive activities which may result from the Construction Activities.

6.3.5 Management and Mitigation Measures

- A Public Consultative Forum must be established. The members of the Consultative Forum should include the ECO and representatives of the Ebenheaser community, Ward Councillors, and applicable Catchment Management Agency;
- The DWS in consultation with the Clanwillian Municipality and Clanwilliam Aquatic Club must identify alternative sites to locate the facilities (i.e. Clanwilliam Municipal Resort) lost due the raising of the dam
- A Complaints and Comments Register must be kept onsite at all times and should be provided to any I&AP who wishes to report a complaint relating to the proposed project. The following information must be recorded in the Complaints and Comments Register:
 - Name and contact detail of the complainant;
 - Date, time and nature of the complaint;
 - Corrective measures that were implemented / manner in which the complaint or comment was addressed;
 - o Summary and evidence of formal response provided to the I&AP by the Contractor in consultation with the ECO.
- A Workforce Recruitment Policy aimed at controlling the influx of speculative job seekers
 and ensuring that the local community benefit from employment opportunities that are
 generated during the Construction Phase, should be developed. The Workforce
 Recruitment Policy should be developed by the Contractor in consultation with the Public
 Consultative Forum and project proponent; and
- Where reasonably possible and practical the Contractor should provide onsite housing to workers which are not local. In consultation with, and providing that the surrounding communities are in agreement, workers may be housed in surrounding communities;

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed.

6.3.6 Corresponding Environmental Authorisation Condition

Condition 23.10 and Condition 23.11 of the Environmental Authorisation explicitly calls for the revised EMPr (this document) to include a strategy to ensure ongoing communication between I&APs and the Project Team throughout the Construction Phase as well as provisions to address social impacts associated with the influx of workers to the area.

6.4 Storm water and Erosion Control

6.4.1 Aspect

All bare and exposed areas will be vulnerable to erosion. The construction of culvert inlets and outlets, side drains, and coffer dams are likely to leave these areas susceptible to soil erosion in the vicinity of the construction site, and lead to elevated turbidity levels in the river. Contaminated storm water from the batching plant may adversely impact on water resources in the area.

6.4.2 Impact

Sediment laden runoff from construction areas will result in elevated levels suspended solids in the watercourse. The increased volume of suspended solids in the watercourse will reduce the clarity of the water and sunlight penetration. This will in turn adversely impact on the biota of a river, smothering and abrading plants and animals, blocking out light, and reducing the overall productivity of the system. Inadequate control of storm water runoff from the batching plant will result in the release of contaminated water into the receiving environment.

6.4.3 Objective

It must be ensured that all reasonable measures are put in place to prevent erosion and the release of contaminated storm water and sediment laden into the receiving environment.

6.4.4 Target

The following targets will be indicative of whether the set environmental objective has been reached:

- · No formation of erosion channels caused by construction activities; and
- No release of contaminated storm water into the receiving environment.

6.4.5 Management and Mitigation Measures

The following management and mitigation measures relating to storm water runoff and erosion prevention must be implemented:

- The volume of water required for the operation of the batching plant must be regulated to maintain the required moisture content and wastage of water and additional runoff from these areas:
- The implementation of dust-control activities which entails dampening the surface through wetting may not result in run-off volumes that are large enough to result in erosion;
- All reasonable measures must be taken to avoid the concentration surface water or storm water to be concentrated (i.e. avoid ponding of water);
- Erosion control measures including the use of berms to direct runoff to settling ponds as
 well as the construction and maintenance of coffer dams to settle sediments must be
 employed. Settling ponds with accumulated sediments need to be cleared before the
 onset of winter rains, and the construction of roads and causeways should be confined to
 the period October to May;
- Monitoring of the sediment load within the watercourse should take place both upstream
 and downstream of the construction site and in accordance with the approved Riverine
 Monitoring Programme. The maximum turbidity must be determined by an aquatic
 ecosystem specialist prior to the commencement of construction activities; and
- Vegetation cover must be retained for as long as possible and only clear areas of the site where it is necessary for construction;
- Any erosion channels caused by construction activities must be suitably stabilised and rehabilitated to an acceptable condition.

Management measures relating specifically to the operation of the batching plant include:

- The release / discharge of contaminated water to the environment will not be permitted;
- Unused cement bags will be stored in a sealed container;
- Contaminated and wastewater generated by the cleaning of equipment and flushing of mixers will not be released into the environment;
- A wastewater collection system must be developed to store all contaminated wastewater prior to the appropriate disposal thereof to a registered waste disposal facility; and
- All visible remains of excess concrete will be physically removed from the batching plant area following the completion of the construction activities.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed, unless otherwise indicated.

6.4.6 Corresponding Environmental Authorisation Condition

Condition 20 and Condition 23.12.3 of the Environmental Authorisation explicitly calls for the revised EMPr (this document) to include storm water control measures as well as for the development of a Riverine Monitoring Programme, respectively.

6.5 Construction site preparation

6.5.1 Aspect

The establishment of the site will entail demarcating, preparation and clearing of the site as per the approved site plan, erecting site offices, and concrete aggregate stockpiles as well as material storage areas.

6.5.2 Impact

The establishment of the site will necessitate site preparation and clearing, which will result in a loss of vegetation within the demarcated site camp area.

6.5.3 Objective

Minimise environmental impacts associated with site establishment.

6.5.4 Target

Establishment of the in accordance with the approved Site Plan, thereby confining the associated environmental impacts to the predetermined area.

6.5.5 Management and Mitigation Measures

- Identify and demarcate the extent of the site camp as per the approved location described in Section I of the Environmental Authorisation; and
- The Contractor must provide a Site Plan for the approval of the ECO and the Engineer prior to the establishment of the site. The Site Plan must show the following:
 - o Buildings and structures;
 - ·o Contractors' accommodation;
 - Contractors' camp and lay down areas;
 - o Site offices;

- Access Route:
- Site laboratories; and
- o Batching plants.

6.5.6 Corresponding Environmental Authorisation Condition

Condition 23 of the Environmental Authorisation calls for the revision and amendment of the EMPR to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADEP as part of the final EIR submission.

6.6 Solid Waste Management

6.6.1 Environmental Aspect

The inherent nature of construction activities will generate domestic and solid waste.

6.6.2 Environmental Impact

The inappropriate storage and disposal of solid waste will result in environmental pollution.

6.6.3 Environmental Objective

The waste management hierarchy, which advocates that the disposal of waste as a last resort and only implemented in the event where the generation of waste cannot be avoided, nor reduced, will be applied to all construction activities

6.6.4 Environmental Target

The adoption of the waste management hierarchy will result in continual reduced volumes of waste being generated and disposed of at an appropriate, registered landfill site.

6.6.5 Management and Mitigation Measures

The following waste management measures relating specifically to solid waste must be implemented:

- All domestic waste must be placed in litter bins located as required on the Work Site and within the Contractors camp;
- Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes);
- Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out:
- Ensure that personnel make use of the litter bins provided. Keep all Work Sites and at the Contractors camp tidy and litter free at all times.

- · All litter bins weekly (or as required before they reach capacity);
- Dedicated temporary waste storage area must identified within the construction footprint;
- A Safe Disposal Slip Register must be maintained by the Contractor;
- · Ensure suitable housekeeping; and
- The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs;
- · All solid waste will be disposed of at suitable licensed disposal sites; and
- As far as reasonably possible wastes should be removed during off-peak periods to reduce the impact on the movement of local traffic.

6.6.6 Corresponding Environmental Authorisation Condition

Condition 23 of the Environmental Authorisation calls for the revision and amendment of the EMPR to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADEP as part of the final EIR submission. The EA also refers to the adoption of the Waste Management Hierarchy.

6.7 Hazardous waste management

6.7.1 Aspect

Hazardous substances will be used and stored on site and will include diesel, curing compounds, shutter oil and cement.

The inappropriate handling or storage of any hazardous substance which is released into the receiving environment (i.e. through spillage) will result in the contamination of soil and immediate watercourses. A significant hazardous substance spills which enters the watercourse will adversely impact on the aquatic ecosystem and reduce the quality of water used by downstream farmers for irrigation.

6.7.2 Objective

Ensure the protection of the receiving and sensitive environments through the correct management and handling of hazardous substances.

6.7.3 Target

No environmental pollution caused by the handling and storage of hazardous substances.

6.7.4 Management and Mitigation Measures

The following management and mitigation measures relating to the storage and handling of hazardous substances must be implemented:

- All hazardous substances (including paint and fuel) must be stored in secure, safe and weatherproof facilities, underlain by a bunded concrete slab to protect against soil and water pollution;
- Any accidental spills must be cleaned immediately, treating the spilled material using absorbent material. A spill kit must be kept on site to use in the event of a hazardous substance spillage;
- Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement;
- Used cement bags will be stored so as to prevent windblown dust and potential water contamination and will be appropriately disposed of;
- Controlled loading / unloading areas must be underlain by impervious paving or PVC sheet to protect against soil and water pollution;
- Environmental Awareness Training must include the correct handling, use and disposal of any spilled hazardous substance;
- Material Safety Data Sheets which provides all information relating to the specific hazardous substances stored on site must be prepared and be readily accessible;
- Empty containers in which hazardous substances were kept are to be treated as hazardous waste and disposed of at a licenced hazardous waste disposal facility;
- All storage tanks containing hazardous materials must be placed in bunded areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material.

The following management and mitigation relate specifically to the temporary storage of fuel onsite:

- The fuel tanks must be designated and installed in accordance with the relevant Oil Industry Standards and SANS codes where applicable for above ground storage tanks;
- Fuel storage tanks must be located within bund (110% of the tank's storage capacity);
- During fuel tanker delivery, the tanker driver must be present at all times during product offloading. Should an incident occur, and emergency cut-off switch must be used to immediately stop fuel delivery. Flexible hoses with dry-beak couplings and emergency isolation must be used:
- The project proponent must ensure that effective stock inventory monitoring, recording
 and regular auditing takes place for early identification of possible leaks and maintain a
 leak history for the site;
- The requirements of the Occupational Health and Safety Act (85 of 1993) must be adhered to;
- Crash barriers must be installed around the fuel tanks;
- An onsite emergency plan must be developed and implemented and must be drafted in consultation with the relevant Municipality's Emergency Services; and

 Within six months of the tanks ceasing to be functional for the purpose of temporary fuel storage, the tanks and associated infrastructure must be removed from site at the expense of the project proponent. The area associated with the fuel storage tanks and associated infrastructure must be rehabilitated to the satisfaction of the ECO and relevant local municipality.

6.7.5 Corresponding Environmental Authorisation Condition

Condition 17 of the EA provides management and mitigation measures specific to the temporary storage of fuel to be implemented. As per Condition 23.12.8 of the EA, the revised EMPr must include management and mitigation measures relating to the storage and management of hazardous materials and other construction materials such as cement, detergents and paints.

6.8 Aquatic ecosystems management

6.8.1 Aspect

Water quality, especially turbidity and pH, in the Olifants River immediately downstream of the construction site may deteriorate due to construction related activities. Furthermore, pollutants may find their way into the river system. Typical sources of pollution include oils and fuels from construction vehicles and construction material such as cement, detergents, paints and other chemicals.

6.8.2 Impact

Any pollutants which find their way into the river system could damage to the riparian habitat, lead to increased siltation (water quality deterioration) and adversely affect aquatic biota (e.g. Clogging of gills, influence movement).

6.8.3 Objective

Ensure that all reasonable measures are taken to prevent any impacts on the characteristics of the watercourses associated with the development area.

6.8.4 Target

- The downstream flow regime must remain unchanged,
- The downstream water quality to remain within acceptable ranges, as prescribed by Resource Water Quality Objectives.

6.8.5 Management and Mitigation Measures

The following management and mitigation measures aimed at preventing any adverse impacts on the aquatic biota must be implemented:

- Silt traps during construction within the watercourse channel and along the riparian habitat should be installed and maintained.
- If silt traps are not deemed feasible, other suitable measures need to be taken to limit the suspension of unnaturally high sediment volumes in the stream;
- Implement site specific and suitable storm water measures during construction to prevent the ingress of runoff into watercourses; and
- Ensure proper storage and safe handling of hazardous substances.

6.8.6 Corresponding Environmental Authorisation Condition

Condition 23.12.11 of the Environmental Authorisation stipulates that the revised EMPr must make provision for the management and rehabilitation of sedimentation of the riverine systems caused by construction activities.

6.9 Material sourcing, earthworks and stockpiles

6.9.1 Environmental Objective

Ensure that materials are sourced from authorised operations and that stockpiled material potential impacts the environment is limited.

6.9.2 Environmental Target

A comprehensive record providing the source of all sourced material will be maintained. Stockpiled material must not exceeds heights that will create a visual intrusion nor generated dust pollution.

6.9.3 Management and Mitigation Measures

The following management and mitigation measures should be implemented to achieve the set environmental target relating to material sourcing, earthworks and stockpiles:

- The Contractor will be required to prepare a source statement to indicate the sources of all construction materials and submit these to the Engineer for approval. The Source Statement must include sources from commercial suppliers;
- Stockpiles will not be allowed underneath trees or against the trunks of trees;
- Stockpiles will be constructed and maintained to avoid erosion of the material and contamination of the surrounding environment;

- Stockpiles will be kept free of all alien vegetation;
- The heights of stockpiles should be minimised as far as possible to reduce wind entrainment and stockpiles should be located as far away from sensitive receptors as possible; and
- Windbreaks should be erected around stockpiles where possible in order to reduce wind entrainment of dust emissions.

6.10 Topsoil management

6.10.1 **Aspect**

Prior to the commencement of the construction activities, the topsoil from the areas where construction activities will be undertaken, excluding the batching plant and construction site camp.

6.10.2 Impact

The incorrect handling and storage of topsoil will reduce the re-growth potential of the topsoil to be used for rehabilitation of the construction footprint.

6.10.3 Objective

Ensure that all reasonable management measures are implemented to maintain the regrowth potential of the topsoil to be used for rehabilitation of the construction footprint.

6.10.4 Target

To retain the usefulness of topsoil for the rehabilitation of the site.

6.10.5 Management and Mitigation Measures

Management and mitigation measures relating to the removal, storage and maintenance of topsoil includes the following:

- Prior to the commencement of the construction activities the topsoil layer must be removed and be stockpiled separately from overburden (subsoil and rocky material). In the absence of a recognizable topsoil layer, strip the upper most 300mm of soil;
- Co-ordinate works to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Vegetation cover must be retained for as long as possible;
- Stripping of the topsoil must not be carries out when wet;
- Topsoil must be stored in a demarcated area;
- Stripping of the topsoil may not be carried out during wet / high rainfall periods;
- Stockpile topsoil stripped from different sites separately, as reapplication during rehabilitation must preferably be site specific. If necessary keep a stockpile register.

- Do not mix topsoil obtained from different sites.
- Topsoil is to be handled twice only once to strip and stockpile, and once to replace and level.
- Position topsoil stockpiles on the higher side of a disturbed area, and above a 1:50 year flood line wherever possible.
- Ensure that all topsoil is stored in such a way and in such a place that it will not cause the damming up of water, erosion gullies, or wash away itself.
- Stockpiled material may not exceed a height of 2 meters;
- Protect topsoil stockpiles from erosion;
- Exotic / invasive plants and broad leaf weeds that emerge on topsoil stockpiles removed by hand;
- If topsoil is to be stockpiled for extended periods, especially during the wet season, stockpiles may be re-vegetated with indigenous grasses and covered with a protective material such as hessian mate;
- Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery.
 This will render the topsoil unsuitable for use during rehabilitation; and
- The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation, for reasons due to his negligence or mismanagement on site.

6.11 Visual and Aesthetics Management

6.11.1 **Aspect**

The establishment of the construction site, construction activities, establishment of site infrastructure and security lighting the construction area during the evening will alter the visual aesthetics of the immediate area.

6.11.2 **Impact**

Safety and security lighting of the site camp area, batching plant and specific construction areas where such activities are carried out during the evening will create a visual intrusion on residences in close proximity to the site and by-passers. Dust generated by the construction activities can also result in a visual intrusion. The establishment of the construction site, construction activities and the visibility of the site infrastructure will constitute a visual intrusion.

6.11.3 Objective

Ensure that all reasonable management measures are implemented to reduce the significance of the impact on the aesthetic character of the area.

6.11.4 Target

No complaints raised by I&APs relating specifically to the impacts to visual quality associated with the proposed project.

6.11.5 Management and Mitigation Measures

- The visual impact of raising the dam wall by 15 m, by adding concrete on the downstream face of the overspill, cannot be significantly mitigated due to its scale in the landscape. Viewer related mitigation measures could however be implemented, including for example, the planting of trees at receptor sites (e.g. Cederview) to screen the raised wall and accordingly minimise the visual impact. In this regard, DWS could provide saplings for those who would like to plant and screen the raised wall as an exercise of goodwill, i.e. make trees available to landowners for planting during and at the end of construction:
- All reasonable measures must be taken to avoid the generation of dust as provided in Part 6.14 of this EMPr:
- The stockpiles may not exceed heights which will be visible beyond the demarcated stock area. Where practical stockpiles should also be located in areas which are not in the line of sight of surrounding land users;
- The movement of construction vehicles and workers must as far as reasonably possible be restricted to the immediate site and access roads;
- As far as reasonably possible construction activities should confined to daylight hours;
- It must be ensured that rubble, litter and construction rubble are collected and appropriately stored until the collection and disposal thereof at an appropriate registered landfill site;
- Appropriately site the construction camp as well as other storage areas and consider screening through the erection of shade cloth; and
- The visual intrusion associated with lighting of the construction site must be managed through the implementation of the following (but not limited to):
 - o The mounting height of light fixtures must be kept as low as possible; and
 - Making use of motion detectors on security lighting, to ensure that area remains dark until lighting is required for security purposes.

6.11.6 Corresponding Environmental Authorisation Condition

Condition 23.12.10 of the Environmental Authorisation specifies that the revised EMPr must make provision for management measures aimed at mitigating the visual impacts associated with the propose project, with specific reference to light pollution during the evening.

6.12 Air Quality Management

6.12.1 **Aspect**

The movement of construction vehicles across bare soil surfaces and the exhaust furnes gaseous pollutants (e.g. sulphur dioxide) released from vehicle exhausts will alter the ambient air quality of the immediate area. High wind speeds is likely to generate dust particles from topsoil and spoil stockpiles.

6.12.2 Impact

The release of pollutants generated by gaseous emissions and the release of particulate matter into the air, will reduce the quality of air in the immediate areas surrounding the construction footprint.

6.12.3 Objective

It must be ensured that the volumes of dust generated by the construction and associated activities, do not exceed the National Ambient Air Quality Standards and Minimum Emissions Standards and may not result in any adverse impacts on human health.

6.12.4 Target

The following will serve as indicators of the extent to which the environmental objectives relating to the management of air quality, have been reached:

 No complaints recorded by I&APs relating specifically to dust pollution and health concerns;

6.12.5 Management and Mitigation Measures

- Appropriate dust suppression measures or temporary stabilising mechanisms must be used in instances where dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather;
- Dust suppression to be undertaken for all bare areas, including construction servitude, access roads, borrow pits, site yard, etc.;
- Any dust control system (i.e. sprinkler or vacuum) that is installed must be maintained and controlled to prevent impacts associated with excessive runoff (e.g. soil erosion);
- Within the construction area, construction vehicle will not be permitted to travel at speeds exceeding 40 km/h; and

• The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of I&APs).

6.12.6 Corresponding Environmental Authorisation Condition

Condition 23.12.7 of the EA stipulates that the revised EMPr must include management measures relating to dust control.

6.13 Noise control

6.13.1 Aspect

The movement of construction activities, construction vehicles and heavy machinery as well as construction personnel will alter the ambient noise levels in the area. The construction site would operate 24-hours per day, for a portion of the construction period, if not for the full duration.

6.13.2 Impact

The increased noise levels caused by the movement of construction activities, construction vehicles and heavy machinery as well as construction personnel, and which is audible by the surrounding receptors may cause a nuisance and disturbance.

6,13.3 Objective

Increased noise levels must be maintained below levels which will be audible by the surrounding receptors.

6.13.4 Target

Noise levels at the boundary of the development footprint will not exceed 7 dB above ambient levels.

6.13.5 Management and Mitigation Measures

The following management and mitigation measures relating to the control of noise generated during the Construction Phase must be implemented:

- Noise mufflers and/or soft explosives must be used during blasting to minimise the impact on humans and animals;
- No amplified music will be permitted on site and in construction camps;
- · All noise levels must be controlled at the source;

- If the noise levels at the boundaries of the site exceed 7 dB above ambient levels, the local health authorities must be informed:
- All onsite workers must be provided with the necessary ear protection gear;
- I&APs must be informed of the excessive noise factors:
- · Local municipal by-laws specific to noise must be adhered to;
- Blasting operations must be strictly controlled with regard to the size of explosive charge
 in order to minimise noise and air blast, and timings of explosions. The number of blasts
 per day should be limited, blasting should be undertaken at the same times each day and
 no blasting should be allowed at night;
- The SANS10103 (2008) should be applied to provides a guidance for determining the community's response to the increase in the general ambient noise level caused by the construction Phase;
- Blasting and noise intensive operations must be restricted to normal working hours (7 am to 5 pm);
- Amplified noise such as sirens and announcements limited to restricted hours other than cases of emergency;
- Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during Work hours and after hours; and
- Respond to community complaints with regard to noise generation, taking reasonable
 action to ameliorate the impact. Where complaints cannot be addressed to the
 satisfaction of all parties, the Contractor will, upon instruction by the Project Manager,
 provide an independent and registered Noise Monitor to undertake a survey of the noise
 output levels.

6.13.6 Corresponding Environmental Authorisation Condition

Condition 23.12.7 of the EA stipulates that noise control measures must be provided in the updated EMPr.

6.14 Traffic and Roads Management

6.14.1 Aspect

Construction vehicles would make use of the existing roads in the area, including the N7 to transport material to the dam site. In addition the construction site would operate on a 24-hour basis. A high volume of traffic currently travels on the N7 between Clanwilliam and Citrusdal, and the road is poor, in parts with no shoulders or passing lanes.

6.14.2 Impact

The increased traffic volumes caused by the travelling of construction vehicles to and from the construction area will impact negatively on the traffic flow, the structural integrity of the N7 and may exacerbate the risk of vehicular accidents, especially at night.

6.14.3 Objective

It must be ensured that the number of construction vehicles and trips undertaken by the construction vehicles to and from the construction area

6.14.4 Target

- No road accidents involving or caused by the construction vehicles travelling on public roads; and
- No complaints reported by I&APs relating to the traffic impacts associated with the travelling of construction vehicles on public roads.

6.14.5 Management and Mitigation Measures

The following management and mitigation measures relating to the management of the traffic impacts resulting from the movement of construction vehicles to and from site during the Construction Phase must be implemented:

- The phasing of the construction of the dam should be considered as a means of ensuring that access for traffic on the N7 is maintained, and conflicts between construction traffic hauling material between the quarry and the dam wall and the traffic on the N7 are reduced;
- The method of transporting concrete from the batching facility (west of the N7 and dam wall) to the dam wall, would need to be carefully considered to reduce the impact on traffic using the N7, i.e. a conveyor system across the existing N7 to the wall would not be desirable, as the risk of spillage over the N7 would pose a significant safety risk to road users. It would accordingly be preferable for concrete pipe/s to be jacked under the road fill to accommodate the conveyor system, thereby reducing the safety risk and traffic impacts; and
- Ensuring that all regulations relating to traffic management are observed and by notifying
 the local traffic officials of programmed construction activities. As far as possible,
 attempts should be made to ensure that high construction-related road usage coincides
 with low traffic flow periods.

6.14.6 Corresponding Environmental Authorisation Condition

Condition 23 of the Environmental Authorisation calls for the revision and amendment of the EMPR to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADEP as part of the final EIR submission.

6.15 Heritage Resource Management

6.15.1 Aspect

The Clan William Dam is located in an area where numerous sites containing rock art, Stone Age tool deposits and other culturally significant artefacts are found.

6.15.2 Impact

The raising of the dam could result in the inundation of inter alia significant artefacts and rock paintings from the Early, Middle and Later Stone Ages, as well as historical structures, road infrastructure, industrial infrastructure, quarries and graves.

6.15.3 Objective

Ensure that a documented record all heritage and paleontological artefacts within the development area is established. Prevent disturbance and damage of unmarked graves (e.g. Khoisan Graves).

6.15.4 Target

No disturbance to sites of heritage importance and burial sites.

6.15.5 Management and Mitigation Measures

The following management and mitigation measures relating to reduce the significance and / or damage to heritage and paleontological artefacts during the Construction Phase must be implemented:

- Any heritage or paleontological artefact (e.g. Early Stone Artefacts) uncovered / found during the Construction Phase should be fenced off for protection. The provincial Heritage Resource Agency must be notified of any found heritage or paleontological artefact. Furthermore a professional archaeologist must monitor such operations at a schedule agreed upon by the provincial Heritage Resource Agency;
- In the event where any remains be found on site that is potentially human remains, the South African Police Service must be informed thereof and all works surrounding the area should be halted. Following public consultation, the graves must be exhumed and re-interred either in a new cemetery or relocated to the Municipal Cemetery in Clanwilliam:
- The photographic record of the development footprint as specified in Condition 22 of the EA must be verified by a professional archaeologist prior to the onset of the construction activities; and

 No heritage material be destroyed or removed from site without a relevant permit issued by the Provincial Heritage Resources Authority.

6.15.6 Corresponding Environmental Authorisation Condition

Condition 22 of the EA stipulates mitigation measures that must be implemented to reduce the significance / prevent impacts on heritage resources as well as management measures to be implemented in the event of any heritage remains being uncovered.

The proponent has appointed a heritage resources specialist that has commenced with the relocation of rock art within the inundation zone between the current water level and anticipated purchase line. The specialist expects to complete mitigation actions and relocations by end of 2015.

6.16 Health and Safety

6.16.1 **Aspect**

The nature of the construction activities and magnitude of the proposed project activities inherently have the potential to impact on the health of the construction workers and the community.

6.16.2 Impact

Unsafe working conditions and the absence of a Health and Safety Plan may result in injury to workers and loss of life.

6.16.3 Objective

Provision of a safe working environment to construction workers and the public.

6.16.4 Target

Ensuring that safe working environment is provided will be dependent on the following:

- Implementation of an approved Health and Safety Plan
- · No incidents, injury or loss of human life; and
- Compliance with the Occupational Health and Safety Act.

6.16.5 Management and Mitigation Measures

The following mitigation and management measure aimed at ensuring the safety of working and preventing injury or loss of human life must be implemented:

- The safety of all construction and operational personnel, as well as any member of the public on the site is the responsibility of the Contractor.
- Control access onto and off the site by means of a register system;
- Ensure that first aid / emergency facilities / procedures are in place;
- Ensure that all personnel are trained in basic site safety procedures;
- A register with contact numbers of all people employed and one emergency contact person for each employee;
- Keep a list of all relevant emergency numbers in an easily accessible location on site.
- Maintain a record of all incidents, accidents and illnesses on site and make the information available at meetings;
- Ensure that proper footwear is worn by employees at all times;
- Ensure that employees are issued with and make use of the necessary safety equipment
 when working in dusty, noisy and / or dangerous situations. Such equipment may include,
 but is not necessarily limited to hardhats, goggles, masks, earplugs, gloves, safety
 footwear and safety ropes as required.
- Ensure that adequate drinking water, wash water and sanitary facilities are available at all times and on all work sites.
- A designated are for food storage, preparation and consumption must be provided on site;
- Ensure that all vehicle and machine operators are qualified and licensed to operate their vehicles / machines;
- The Contractor will prepare and submit an Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval by an Health and Safety Officer prior to the commencement of the construction activities;
- Fencing and barriers must be put in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Applicable notice boards and hazard warning notices will be put in place and secured.
- All construction personal must be clearly identifiable and provided with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993); and
- Cordon off dangerous excavations or Works that may pose a hazard to humans and animals.

6.17 Site rehabilitation

6.17.1 **Aspect**

The rehabilitation works carried out following the completion of all construction activities will include the following:

- Removal of structures and infrastructure:
- Inert waste and rubble:
- Hazardous waste and pollution control;

- Final shaping;
- · Topsoil replacement and soil amelioration;
- · Ripping and scarifying;
- Planting;
- · Grassing; and
- Maintenance of the rehabilitated areas.

6.17.2 Objective

Reinstatement and rehabilitation of construction site to the Satisfaction of the ECO and WCDEADP.

6.17.3 Target

The rehabilitation and remediation activities will ensure that a complete site clean-up is carried out and that the entire construction site is reinstated and rehabilitated.

6.17.4 Management and Mitigation Measures

Removal of structures and infrastructure

Following the completion of the construction activities, the area must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment. All construction plant, equipment, storage containers and temporary fencing must be removed from site;

Inert waste and rubble

- Rubble, including surplus rock, foundations and batching plant aggregates will be removed from the construction site and disposed of at a registered landfill site; and
- All waste storage containers will be removed from site.

Hazardous waste and pollution control

- All portable sanitation facilities will be removed by a certified contractor. It must be
 ensured that no leaks or spillage from sanitation facilities occurs during the removal
 thereof; and
- All hazardous waste which is temporary stored on site, including the storage containers
 must be removed from site and disposed of at a registered hazardous landfill site.

Final Shaping

 Where possible all disturbed areas must shaped so as to blend in with the surrounding landscape;

- Where possible, programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results;
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material; and
- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is smoothed over to blend in with the surrounding landscape.

Grassing

- · Grassing must be undertaken by a suitably qualified Contractor;
- Grass areas using the method specified on the plant plans;
- Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is higher; and
- Hydro-seeding with a winter mix will only be specified where re-grassing is urgent, and cannot be postponed until summer.

Ripping and Scarifying

- Rip and / or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. The ECO will specify whether ripping and / or scarifying is necessary, based on the site conditions immediately before these works begin;
- Rip and / or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works;
- · Rip and / or scarify along the contour to prevent the creation of down-slope channels;
- Rip and / or scarify all areas at 300mm intervals (but not more than 400mm intervals), ensuring that the lines overlap; and
- Areas may not be ripped / scarified under wet conditions, as the soil will not break up.

Topsoil replacement and soil amelioration

- The principle of Progressive Reinstatement must be followed wherever possible. This
 includes the reinstatement of disturbed areas on an ongoing basis, immediately after the
 specified construction activities for that area are concluded;
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions:
- Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased:
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying
 grass and other fine organic matter in all disturbed areas of the construction site,
 including temporary access routes and roads. Replace topsoil to the original depth. These
 areas will be quantified by the ECO;
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil
 available from a particular soil zone to produce the minimum specified depth, topsoil of
 similar quality may be brought from other areas of similar quality;

- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage, and approved by the ECO; and
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation.

Maintenance of rehabilitated areas

- Allow for a maintenance period of one year following practical completion;
- Landscape maintenance must be undertaken by a suitably qualified professional landscape architect;
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type which previously existed, unless otherwise indicated in the Contract or specified by the EO / ECO,
- · Water all transplanted, planted and grassed areas;
- For planted areas that have failed to establish, replace plants with the same species as originally specified. The same species as originally specified must be used unless otherwise specified by the EO / ECO; and
- A minimum grass cover of 80% is required, and individual plants must be strong and healthy growers at the end of the Maintenance Period.

7 Resource Impact Monitoring

This section deals with monitoring of local resources as specified during the Environmental Impact Assessment phase and specialist studies. No specific monitoring measures were provided and the following were extracted from specialist studies:

7.1 Ecological

In order to ensure that the Reserve, Ecological Flow and riverine health requirements are met, a detailed riverine monitoring programme must be developed and submitted together with the Clanwilliam Dam and Bulshoek Weir operating rules.

7.2 Heritage

Early Stone Age artifacts and/or fossilized bones might be exposed during earth moving operations. A professional archaeologist must monitor any such operations at a schedule agreed upon by Heritage Western Cape and the applicant.

7.3 Groundwater

Appropriate measures to mitigate the impacts on groundwater resources must be determined, designed and implemented, with extensive groundwater monitoring to be done to inform these measures.

The development of an effective monitoring framework must include the following aspects:

7.3.1 Development of a monitoring framework

- Aerial photo interpretation (1:50 000 to 1:10 000 orthophoto scale) and field mapping of boundaries in Nardouw Subgroup (bottom and top of Skurweberg Aquifer, possible aquitard zone between Skurweberg and Rietvlei hydrostratigraphicunits) around Clanwilliam Dam site and town must be undertaken;
- Conceptual formulation, spatial planning of monitoring sites and technical design of a groundwater monitoring network appropriate in location and scale to the anticipated problem of aquifer-related impacts must be considered.
- Incorporation of local seismographic monitoring for the detection and hyocentral location of micro-earthquakes possibly related to groundwater movement along major and/or minor hydrotect structures.

7.3.2 Field investigation

- Preliminary fracture mapping at a scale of 1:50 000, to supplement structural information on a 1:10 000 scale would be needed;
- Siting of monitoring wells and borehole design adjacent upstream of the Clanwilliam Dam:
- Siting of monitoring wells and borehole design in low lying locations within the town of Clanwilliam;
- Preparation of contractor specifications and tender documents for drilling and pumptesting of further new monitoring wells;
- Drilling supervision and logging of new monitoring wells;
- Installation of continuous automatic data loggers in monitoring boreholes;
- Aquifer pump-testing and hydraulic interpretation of selected monitoring wells for aquifercharacteristic parameters.
- Tracer testing in the vicinity of the springs to estimated groundwater flow rates and other transport parameters

7.3.3 Numerical modelling and cost-benefit analysis

- Predictive hydrogeological modelling of groundwater levels, groundwater flow rates and volumes related to different full supply level (FSL) scenarios for the raised Clanwilliam Dam, using software appropriate to fractured-rock systems and sensible far-field and near-field boundary conditions;
- Modelling Report;
- Hydrogeological input to engineering cost-benefit analysis and viability evaluation of dam-wall reconstruction options;
- Final Summary Report

7.4 Description of the monitoring programme

When developing a monitoring programme, the following should be addressed. The monitoring programme should consist of three main aspects:

- Baseline assessment. This must occur prior to the start of the project or activity in order to determine the level and status of the environmental parameters prior to any impacts associated with the project or activity;
- Impact (or performance) monitoring. This monitoring should be ongoing throughout the project life-cycle and must be implemented to ensure that environmental impacts are within the predicted levels; and
- Compliance monitoring. This monitoring must be implemented to ensure that the prescribed mitigation measures are having the predicted and desired effect. This monitoring would be conducted periodically, the timing of which will vary from project to

project. It must be used to check that the levels of specific environmental parameters are compliant with laws, regulations, standards or guidelines, as applicable. The programme must make provision for remedial measures to be effectively implemented in the event of non-compliance, i.e. when mitigation measures are inadequate or when impacts have been underestimated in the impact assessment study.

8 Monitoring Compliance With Empr

8.1 Environmental Awareness Plan

In keeping with Regulation 33(j) of the NEMA EIA Regulations 2010 (Government Notice R.543) this part of the EMPr provides an account of the approach that will be adopted for Environmental Awareness Plan during the Construction Phase of the proposed project. The Environmental Awareness Plan is intended to describe the method that will be adopted by the DWS to inform any person acting on their behalf, including an agent, sub-contractor, employee or any person rendering a service, of any environmental risk which may result from the implementation of the project activities and the manner in which risks must be managed in order to avoid adverse environmental consequences. Providing Environmental Awareness Training is fundamental for ensuring that the onsite personnel understand how they can play a role in achieving the objectives specified in the EMPr.

The Environmental Officer, in conjunction with the employer, should develop an environmental awareness plan in order to address the following:

- Training needs of site and project personnel
- Training material to be used
- Language of training
- General environmental awareness i.e posters, toolbox talks etc
- Include site-specific findings as per the EIA
- Health and Safety aspects
- HIV/Aids Awareness
- Environmental Reports
- Environmental Terminology

Once the awareness plan and training material are available, the entire workforce and project management team should undergo an environmental awareness training course. Environmental awareness training is critical for the workforce to understand how they can play a role in achieving the objectives specified in the EMP.

8.2 Method Statements

A Method Statement must be compiled for every activity undertaken by the Contractor which poses a risk to the environment (natural, biophysical and social), and includes the following:

- The Method Statement should be submitted at least 7 working days prior to the commencement of work to the ECO.
- A method statement describes the scope of the intended work in a step by step description to ensure that the ECO/EO understands the Contractors intentions. This will enable them to assist in devising any mitigation measures which would minimise environmental impact during these tasks.
- The ECO may require changes to a Method Statement if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMPr or any legislation.
- The Contractor shall carry out the activities in accordance with the approved Method Statement.
- Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel.
- Approval of the Method Statement shall not absolve the Contractor from any of his
 obligations or responsibilities in terms of the contract.
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a Method Statement.
- For each instance where it is requested that the Contractor submit a method statement to the satisfaction of the ECO, the format should clearly indicate as a minimum the following:
 - Responsible person (name and ID number) and an alternative (name and ID number);
 - Legal Requirements;
 - Training Requirements;
 - o Timing of activities;
 - o Materials to be used:
 - o Proposed construction procedure designed to implement the relevant environmental specifications;
 - o The system to be implemented to ensure compliance with the above;

o PPE required;

- A detailed description of the process of work, methods and materials;
- Emergency Procedures;
- o Response in the case of a non-compliance; and
- Other information deemed necessary by the ECO.
- All Method Statements must be signed by the Engineer

Work may not commence until the method statement has been approved by the ECO. All
method statements will form part of the EMPr documentation and are subject to all terms
and conditions contained within the EMPr main document.

8.3 The following Method Statements shall be prepared by the Contractor for approval:

- Contractor's SHE Officer and Fire Officer. The name and letter of appointment of the
 Contractors SHE Officer and Fire Officer must be given to the ECO and the terms of
 reference for the work to be undertaken must be detailed including time on site, roles
 and responsibility, interaction with the Contractor and environmental offices, etc.
- Site layout. The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must including the following:
 - o All Contractor's buildings, and/or offices;
 - Lay down areas;
 - Vehicle and plant storage areas, including wash areas;
 - Workshops, if required and approved by ECO;
 - o Fuel storage and dispensing areas, if required and approved by ECO;
 - Cement/concrete batching areas, if required and approved by ECO (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete);
 - o Other infrastructure required for the running of the project.
- Access Routes. Details, including a drawing, showing where and how the access points
 and routes will be located and managed must be provided in a Method Statement. Final
 locations of planned new access roads will be subject to successful negotiations with
 landowners. Details of fences and gates affected or used during the construction
 activities, including a drawing showing the location of fences and access gates must be
 provided.
- Pollution control. Expected solid waste types, quantities, methods and frequency of
 collection and disposal as well as location of disposal sites must be identified and stated
 in a Method Statement. The Method Statement shall further include methods of
 minimising, controlling, collecting and disposing of contaminated water, and details of
 any hazardous substances/materials to be used, together with the transport, storage,
 handling and disposal procedures for the substances.
- Safety considerations. The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements for all types of construction activities on site, including protection against dust, noise, falling objects, work associated with electricity and work at heights.
- Emergency procedures. The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further

- include details of risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.
- Waste management control. The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. Details of any service provider(s) appointed to manage this task must also be provided.
- Storm water and erosion control. The Contractor shall provide details of how storm water
 emanating within or adjacent to the construction site may impact on construction
 activities. Details on how the Contractor will deal with storm water runoff and potential
 erosion within the construction footprint and servitude must be provided. Details of any
 service provider(s) appointed to manage this task must also be provided.

8.4 Compliance auditing and reporting

The independent Environmental Control Officer will be responsible for compliance monitoring, auditing and reporting throughout the life of the proposed development. The required compliance monitoring for the Clanwilliam Dam raising project should include the following:

The ECO and EO shall be responsible for the day-to-day management and implementation of the EMPr. They should ensure that day-to-day activities are captured in a site diary and a photographic record is kept as evidence.

The EO shall be responsible to report any non-conformities to the ECO within 24 hours of the incident and an investigation report within 5 days. Bi-weekly reports to the ECO should be submitted and should include all activities and aspects of the last two weeks.

The EO and ECO shall schedule compliance audits at least once a month to check full compliance to the EMPr and the audit report to be made available to the Department and management.

8.5 Implementation of corrective measures

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved.

When non-conformities do occur that have a negative impact on the environment, these should be rectified by the implementation of corrective actions issued by the ECO and Project Manager within a reasonable or agreed period of time. All corrective actions need to be documented and the outcome photographed and included in the next report.

8.6 Penalties Structure

Section 30 of Chapter five of NEMA proposes penalties for non-compliance with the provisions of Chapter five. Any person who contravenes the regulations set out here or commits an offence as described in this section is liable for a fine or jail term. The responsible person or even the minister within the DWS who is undertaking an activity that contravenes these regulations, will be liable for these penalties. Fines and penalties shall be managed in accordance with the Public Management Finance Act.

A penalties and fines system shall be developed for this project and shall take the following in consideration:

- Penalties will be issued for the transgressions and non-compliances where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications. The Contractor shall be liable to pay a penalty over and above any other contractual consequence.
- Penalties may be issued per incident at the discretion of the PM and ECO. The exact
 value of the penalty imposed shall be at the discretion of the PM and ECO and
 enforcement shall be at the discretion of the Developer. The Contractor will also be
 responsible for remediation costs.
- Such fines will be issued in addition to any remedial costs incurred as a result of noncompliance with the EMPr. The PM will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.
- The PM and ECO shall be the judge as to what constitutes a transgression in terms of this clause subject to the provisions of the General Conditions of Contract.
- For each subsequent similar offence, the penalty may, at the discretion of the PM and ECO be doubled in value to a maximum value to be determined.
- Payment of any penalty in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

A guideline of minimum fine values is provided for minor, moderate and serious offences in Table 8-1 below.

Table 8-1: Guideline to fines for minor, moderate and serious offences

	Offences	Fine
	Minor offences	
•	Littering	
•	Possession of intoxication substances on	
	site.	
•	Failure to use ablutions.	
•	Moving on areas recently landscaped.	R 1500 - 00
•	Disturbing grassed areas.	K 1300 - 00
•	Not parking in demarcated areas.	
•	Not using safety equipment	
•	Wasting of water and electricity.	
•	Not removing domestic waste off site.	
•	Not stockpiling topsoil adequately.	
1	Moderate offences	
•	Oil spills	
•	Persistent oil leeks on vehicles.	
•	Generation of excessive dust and noise.	
	Transgression of the speed limit. Illegal fires.	
	Burying of waste.	R 5000-00
	Use of intoxicate substances on site.	1 3000-00
	Lack of erosion control.	
	Entering non-demarcated areas.	
	Hunting and snaring.	
•	Damaging of pre- identified trees.	
ļ 	Carleya offenses	
	Serious offences	
•	Large oil/ hazardous waste spill.	
•	Removal of pre-identified trees. Damage of pre- identified heritage sites or	
•	objects.	
	Continually exceed noise limits.	
•	Transgression of legal requirements.	R15 000.00
•	Sanitation facilities not adequate.	
•	Pollution of groundwater.	
•	Removal of any protected plant or other	
	species.	
•	Damage or pollution of wetlands.	

8.7 Documentation and Record Keeping

All records related to the implementation of this EMPr (e.g. method statements, audit inspection protocols, incident reports, etc.) must be filed together by the ECO in a safe place where it can be easily retrieved. These records should be kept for two years and should, at

any time, be available for scrutiny by relevant authorities. It is also recommended that photographs be taken of the site prior to, during and immediately after construction/installation, as a visual reference. These photographs should be stored with other records related to this EMPr.

9 Management Review And Revision Of The Emp

This EMPr should not be considered as a stagnant document, but rather as a tool to manage project activities which may result in adverse environmental impacts and to prevent such impacts from happening. In the event where any of the mitigation and management measures provided in this revised EMPr have proven to be less effective due to unforeseen significant changes in the conditions of the receiving environment, the amendment of the EMPr should be initiated by the project proponent in consultation with the WCDEADP.

This EMPr must be revised and amended in any instance where the following provisions are applicable:

- To prevent deterioration or further deterioration of the environment;
- · To achieve prescribed environmental standards;
- Where deemed necessary to accommodate demands brought about by impacts on socioeconomic circumstances and it is in the public interest to meet those demands;
- To ensure compliance with the conditions of the EA;
- · Ensure the continued suitability and adequacy of the EMPr; or
- When this EMPr is in conflict with the principles set out in the NEMA or any act governing the activities associated with the proposed project.

Furthermore this EMPr must be revised in the case where amendments to the current environmental legislation governing the project activities necessitates a revision of the document in order to conform to environmental legislative requirements. The site specific circumstances which warrant an amendment and revision of this EMPr should be led by the findings of the site inspection / audits against documented Monthly Environmental Compliance Audit Reports. Although the EIA Process for the proposed project was initiated in terms of the now repealed ECA, any amendments which are made to this EMPr should be done in accordance with the prescribe process provided in Regulation 46 of the NEMA EIA Regulations (Government Notice R.543).

10 Conclusion

This EMPr has been revised to include not only the conditions provided in the EMPr, specialist recommendations and EIR, but also conform to the environmental legislative requirements and environmental best practice principles. It is the opinion of the EAP that the implementation of the management and mitigation measures provided in the EMPr is sufficient to prevent the environmental impacts associated with the proposed project, thereby facilitating conformance with Condition 23.12.18 of the EA. This EMPr will furthermore contribute the realising the following over-arching objectives set out to be reached by the use of the document as an environmental management tool:

- Ensure that sufficient monetary provision, aligned with the significance of the environmental impact and scale of the project, is made to remediate and rehabilitate the environment impacted on by the construction activities;
- Verifying environmental performance through information on impacts as they occur;
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events and environmental incidents; and
- Providing feedback to drive continual improvement in environmental performance.

The effectiveness of this EMPr will to a large degree rest on adherence to and fulfilling the roles and responsibilities of each role player and stakeholder provided in Part 4, which clearly defines the responsibilities for management actions contained in the EMPr and arrangements for coordination among the role players.

11 References

Department of Water Affairs and Forestry, February 2005 Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition, Pretoria.

Lochner, P. 2005. Guideline for Environmental Management Plans. CSIR Report No ENV-SC 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Ninham Shand Consulting Services. Proposed Raising of Clanwilliam Dam and associated realignment of affected roads Final Environmental Impact Report. 2007.

South Africa. 1993. Occupational Health and Safety Act 85 of 1993

South Africa. 1998. National Environmental Management Act 107 of 1998

South Africa, 1998, National Water Act 36 of 1998

South Africa. 2002. Minerals and Petroleum Resources Development Act 28 of 2002



MINISTRY OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

M 3/6/5

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0001

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Dear Ms Mathe

APPROVAL OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP) IN TERMS OF THE RECORD OF DECISION FOR THE STRENGTHENING AND RAISING OF THE CLANWILLIAM DAM AND ASSOCIATED RE-ALIGNMENT OF CERTAIN SECONDARY ROADS, CLANWILLIAM

The Record of Decision ("RoD") issued on 12 May 2009, the appeal decision dated 22 February 2010 and your correspondence dated 18 January 2015, refer.

Kindly note that the Environmental Management Programme is approved as required in terms of Condition 23 of the abovementioned appeal RoD. However, you are required to compile the Riverine Monitoring Programme and implement it as part of this Environmental Management Programme before construction on the Clanwilliam Dam wall structure commences.

I look forward to receiving your co-operation in ensuring compliance with all the other conditions of the abovementioned EA.

Yours faithfully

ANTON BREDELL

MINISTER OF LOCAL GOVERNMENT,

ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

DATE: 2/3/20

Cc Ms M Govender (Department of Water and Sanitation)

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